STATE OF WASHINGTON
Daniel J. Evans, Governor

DEPARTMENT OF CONSERVATION
Roy Mundy, Director

DIVISION OF WATER RESOURCES
Murray G. Walker, Supervisor

Water Supply Bulletin No. 18

# Water Resources and Geology of the Kitsap Peninsula and Certain Adjacent Islands

By

M. E. Garling, Dee Molenaar and others
with contributions by the
UNITED STATES GEOLOGICAL SURVEY

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Garling, M. E.
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# WATER RESOURCES AND GEOLOGY OF THE KITSAP PENINSULA AND CERTAIN ADJACENT ISLANDS

## ABSTRACT


The Kitsap Peninsula and certain adjacent islands, with a land area of 668 square miles, are located in central western Washington. Bounded on nearly all sides by marine waterways of the Puget Trough, the report area includes all of Kitsap County and portions of Mason, Pierce and King Counties. With an increasing growth rate since World War II, 1962 census figures show an estimated population of 105,000 persons. This amounts to a density of 157 persons per square mile, more than 3.6 times the state-wide average.

The report area has basically a maritime climate, with mild, wet winters, and cool, dry summers. Precipitation is moderate in the southern part of the area, while the northern part of the Kitsap Peninsula, lying more directly in the rain shadow of the Olympic Mountains, receives considerably less rainfall. Mean annual precipitation ranges from about 26 inches in the north to nearly 80 inches in the vicinity of Green and Gold Mountains in the central part of the study area.

The land surface of the Kitsap Peninsula consists primarily of low rolling hills which are remnants of a glacial drift plain. The original plain, underlain by unconsolidated sands, gravels, silts and clays which were deposited by successive glaciers entering the Puget Trough from the north, has been modified and dissected both by glacial and stream erosion, and by wave action.

Rocks in the report area range in age from Tertiary to Recent, the oldest being a thick sequence of basaltic lava flows which are equivalent of the Metchosin volcanics of Eocene age. Overlying the volcanic rocks is the Blakeley Formation of Oligocene age, composed primarily of marine sandstone, shale and conglomerate. These sedimentary rocks are exposed along the shorelines of Port Washington Narrows and Rich Passage north and east of Bremerton, and on the south end of Bainbridge Island. The Blakeley Formation is overlain by thick layers of material consisting of unconsolidated to semiconsolidated sand, gravel, silt and clay which comprise the glacial and interglacial deposits of the Pleistocene Epoch. A mantle of soil, peat, and other Recent alluvial materials, from a few inches to several feet in thickness, overlies most of the report area.

Sufficient ground water for domestic purposes is available from wells in nearly all parts of the study area. In many places domestic supplies are developed from shallow dug wells tapping perched ground water in the recessional outwash materials which overly the relatively impermeable Vashon till. Most of the drilled wells in the report area obtain moderate supplies of ground water from the sands and gravels of the advance outwash and Colvos Sand which underlie the Vashon till. The aquifers with the greatest potential for future development of moderate to large supplies are the coarse sands and gravels of the Salmon Springs(?) Drift which is present at greater depths beneath most parts of the report area. The pre-Salmon Springs(?) deposits, undifferentiated, consist predominantly of massive blue-gray clay and are, therefore, not considered as a potential source for development of large amounts of ground water. Several wells have penetrated the Blakeley Formation but the limited amount of water obtained was generally of poor quality. Due both to the lack of readily available surplus waters and to unfavorable geologic conditions it is improbable that an extensive artificial ground-water recharge program would be suitable in the report area.

As a result of its irregular shape, only a few major stream systems have developed on the Kitsap Peninsula. Most of the study area is drained by many small, relatively short streams that discharge directly into the surrounding marine waters. A study of topographic maps and field investigations disclosed a total of 582 separate stream systems in

the area, of which only 12 have drainage areas exceeding 10 square miles.

Basically similar flow patterns are displayed by most of the streams and, essentially, the variations in flow closely follow the seasonal trend of precipitation. In winter, precipitation occasionally occurs in the form of snow but generally warm temperatures prevent accumulation and the effect of snow storage on streamflow is insignificant. The highest flows are produced by direct runoff following winter storms, whereas low flows, sustained by ground-water effluent, occur during the precipitation deficient summer months.

Both streamflow records and geology indicate that ground-water contributions to streamflow vary considerably throughout the area. Aquifers are commonly continuous across topographic divides, permitting the ground waters of certain basins to migrate to adjacent drainages. Because most drainages are small, little flood damage has occurred in the area.

The flow characteristics of major streams in the area were analyzed from available records and the results are graphically presented in terms of daily-discharge hydrographs, bar charts of monthly discharge, discharge-duration curves, and discharge-duration hydrographs. Various statistics derived from the data show that the variability of annual runoff throughout the report area is generally low and the yield of most streams is quite consistent from year to year. Using the entire period of record for each gage, coefficients of variation for annual runoff range from a low value of about 11 percent for Dewatto Creek to a high value of 26 percent for Huge Creek.

The chemical quality of ground water in the study area is generally adequate for most uses. Measured dissolved-solids contents range from 64 to 346 ppm. However, about 80 percent of the values are less than 150 ppm, and include mostly silica, calcium, magnesium, and bicarbonate. Almost all sampled ground water from the Colvos Sand and younger units contains less than 100 ppm of dissolved solids, whereas water in the Salmon Springs(?) Drift and older formations characteristically contains more than 100 ppm. Concentrations of potassium and phosphate also show characteristic differences from unit to unit, and they can be used in combination with the dissolved-solids content to determine the geologic source of ground water on the peninsula and adjacent islands. Measured hardness-of-water values are as great as 190 ppm, but most of the ground water is soft or only moderately hard (less than 120 ppm). Iron in solution at the time of sample collection was as great as 0.62 ppm, but most water containing more than 0.30 ppm is restricted to the northeastern and southeastern parts of the study area.

Deterioration of ground-water quality may soon become an important factor in some parts of the peninsula and adjacent islands because of increased withdrawals in areas subject to contamination by waters of undesirable quality from deeper aquifers or from the Puget Sound.

Stream and lake water in the study area characteristically contains smaller amounts of dissolved solids than the ground water. For streams, this is especially true during periods of high flow. (During low flow, the streams more nearly resemble ground water chemically because spring flow provides much of the surface-water discharge during such periods.) The surface water is suitable for most uses throughout much of the year. However, streams in the eastern part of the study area carry large amounts of highly colored dissolved organic material during periods following abundant rainfall.

# INTRODUCTION

This study of the Kitsap Peninsula and certain adjacent islands was made by the Division of Water Resources of the Washington State Department of Conservation, with contributions by the U. S. Geological Survey. The report is part of an overall inventory of the State's water resources being conducted by the Division of Water Resources under the general direction of Murray G. Walker, Supervisor, and under the direct supervision of Robert H. Russell, Assistant Supervisor. The sections of the report contributed by the U. S. Geological Survey were prepared under the general supervision of Fred M. Veatch, District Engineer of the Surface-Water Branch, Tacoma, Washington, and Les B. Laird, District Chemist of the Quality of Water Branch, Portland, Oregon.

The sections of the report prepared by the Division of Water Resources are authored by Dee Molenaar, Geologist; M. E. Garling, Hydraulic Engineer; and G. H. Fiedler, Hydraulic Engineer. Authors of the sections contributed by the U. S. Geological Survey are E. G. Bailey, Hydraulic Engineer and A. S. Van Denburgh, Geologist. Specifically, the major areas of contribution and responsibility are as follows:

Robert H. Russell..... Project Supervisor
Dee Molenaar......... Physical description, Economics of the region and Geology and ground-water resources
M. Edward Garling.... Climate, Economics of the region, Streamflow characteristics, Evaluation of the surface-water supply, Water development sites and Water appropriation
Earl G. Bailey........ Basic streamflow data and Floods in the report area
A. S. Van Denburgh... Water quality
Glen H. Fiedler....... Water rights and water law

For clarity of reference, authorships are also indicated under the title of each major section of the report.

## PURPOSE AND SCOPE OF THE INVESTIGATION

Since the close of World War II the Kitsap Peninsula area has experienced a steadily increasing demand for industrial, irrigation and domestic water supplies. Since completion of the Tacoma Narrows Bridge and the Hood Canal Floating Bridge in the southern and northern parts of the Peninsula area, respectively, and with the possible future construction of one or more across-Puget Sound bridges further linking the Peninsula with the mainland, it is evident that there will be a rapid acceleration in the area's economic growth and demand for additional water. To adequately meet the water needs for the expected expansion, a thorough knowledge of the water resources is required.

In planning and compiling information for this report, the authors have tried to answer the following questions:

1. What are the quantitative and qualitative characteristics of the surface and ground-water resources of the area under study?
2. What is the present known demand against the total water resource?
3. How much water is still available for appropriation and where are these supplies located?
4. How much additional water can be made available through the development of surface-water storage reservoirs, and what is the feasibility of artificial recharge of ground-water reservoirs?

Work was started on the Kitsap Peninsula study in October, 1960, and was completed in June, 1963. The study consisted of a compilation of existing data, a thorough evaluation of previous works, and geologic and hydrologic mapping of areas which had not been previously mapped in detail. Existing information was modified and updated with more recent findings.

Because only limited basic data were available on water quality in the report area prior to the start of the project, additional samples of both surface and ground water were collected for this study. With the resulting information, efforts were made to correlate the chemical constituents of ground waters to the geologic formations from which they were obtained, and, likewise, to correlate surface waters to the materials across which they flowed.

The data presented herein are designed to assist engineers, geologists, and hydrologists, as well as municipal, county, state and federal agencies who are actively associated with the planning and development of water resource projects.

## LOCATION AND EXTENT OF AREA

The area under study includes approximately 668 square miles of land located entirely within the Puget Sound lowland in west-central Washington State (fig. 1). It is bounded on the west by Hood Canal and Case Inlet, on the north and east by Admiralty Inlet and Puget Sound, respectively, and on the south and southeast by southern Case Inlet, Nisqually Reach, Cormorant Passage and the Narrows. The area includes all of Kitsap County (402 square miles), and parts of Mason County (108 square miles), Pierce County (121 square miles), and King County (37 square miles). The report covers 15 islands, with McNeil and Ketron Islands being included for cursory surface-water studies only. The total insular area studied covers 86.3 square miles and a total of the peninsular areas covers 581.8 square miles. The project area lies within Townships 19 through 28 North and Ranges 3 West through 3 East, Willamette Meridian.

## PREVIOUS INVESTIGATIONS

Since the 1890's several studies of the geology and hydrology of the Puget Sound lowland have included all or parts of the area of this report. In most cases, however, the previous works referred only generally to the area encompassed by the present report, or dealt with specific problems of limited areal scope.

The earliest geologic investigation which included the study area was made by Bailey Willis. In 1898 Willis described some of the glacial drift stratigraphy of the Puget Sound region. In 1913, J Harlan Bretz described the glaciation of the Puget Sound lowland.

A soil survey of Kitsap County was conducted and a report by Robert Wildermuth and others (1939) describes the various soil types which mantle the county.

Surface water supply papers of the U. S. Geological Survey and Water Supply Bulletins No. 6 and No. 15 of the Washington State Division of Water Resources provide daily, monthly and annual streamflow data for streams in the State of Washington. Data relating to size of drainage areas of Western Washington, as measured above the sites where discharge measurements have been made, were compiled by Donald Richardson (1962) of the U. S. Geological Survey. E. E. Wolcott (1961) of the State Division of Water Resources describes the lakes of western Washington which include all named lakes and unnamed lakes of one acre or more in area within the study area.

Several investigations have been made of geologic and hydrologic conditions within specific parts of the study area. These include an open-file report by A. M. Piper (1930) which discusses water-supply possibilities for use by the U. S. penitentiary on McNeil Island, a report by Howard Coombs (1955) which discusses the geology of the Union River dam site for the City of Bremerton, and a report by R. W. Beck and Associates (1960) which discusses a preliminary engineering study of the Gold Creek reservoir site and distribution route for the Kitsap County Public Utility District No. 1.

The previous geologic and ground-water study most important to this report was that made of Kitsap County proper by J. E. Sceva(1957) of the U. S. Geological Survey. Sceva's work provided the basis for extension of the geologic mapping to include the entire Kitsap Peninsula and certain adjacent islands. Minor modifications were made of Sceva's mapping of Kitsap County, and some stratigraphic units were renamed upon the basis of correlation with more recently examined late Pleistocene deposits in other parts of the Puget Sound lowland. This report incorporated a part of Sceva's information on well logs into updated tabulations.

## CONCURRENT STUDIES

During the course of this investigation, two concurrent studies were being made in adjacent areas. Noble and Wallace (in preparation) of the Division of Water Resources, geologically mapped Thurston County to the south and Walters and Kimmel (in preparation) of the U. S. Geological Survey mapped part of Pierce County to the east. These authors exchanged ideas with the result that many complex geologic and stratigraphic problems common to all areas were better understood and correlated.

## ACKNOWLEDGMENTS

The writers wish to acknowledge assistance rendered by a number of individuals and agencies without which this report could not have been completed.

Harbor Drilling Company of Gig Harbor, Reliable Drilling Company of Bremerton, Stoican Drilling Company of Port Orchard, and Pioneer Drilling Company of Seattle all furnished drillers' logs and pump test data for many wells located within the study area.

Robinson and Roberts, Ground-Water Geologists, Tacoma, and staff members of the U. S. Geological Survey, Ground-Water Branch, Tacoma, were very helpful in furnishing data and comment on geohydrologic problems. Special thanks is due Dr. J. Hoover Mackin, Department of Geology, University of Texas, for his assistance in interpretation of complex stratigraphic problems.

Personnel of the state and county health departments were very helpful in supplying water quality data and information on water systems serving the public. The Chambers of Commerce of Port Orchard and Winslow were helpful in furnishing information on population and economics of the area. Everett G. Humble, Superintendent of the City of Bremerton Water Department, furnished data on the city's municipal water supply system.

Information about the area's fishery resources was furnished by personnel of the State Departments of Fisheries and Game.

In addition, the authors owe thanks to the many well owners, operators of community water-supply systems, and others who furnished data but are too numerous to cite individually.

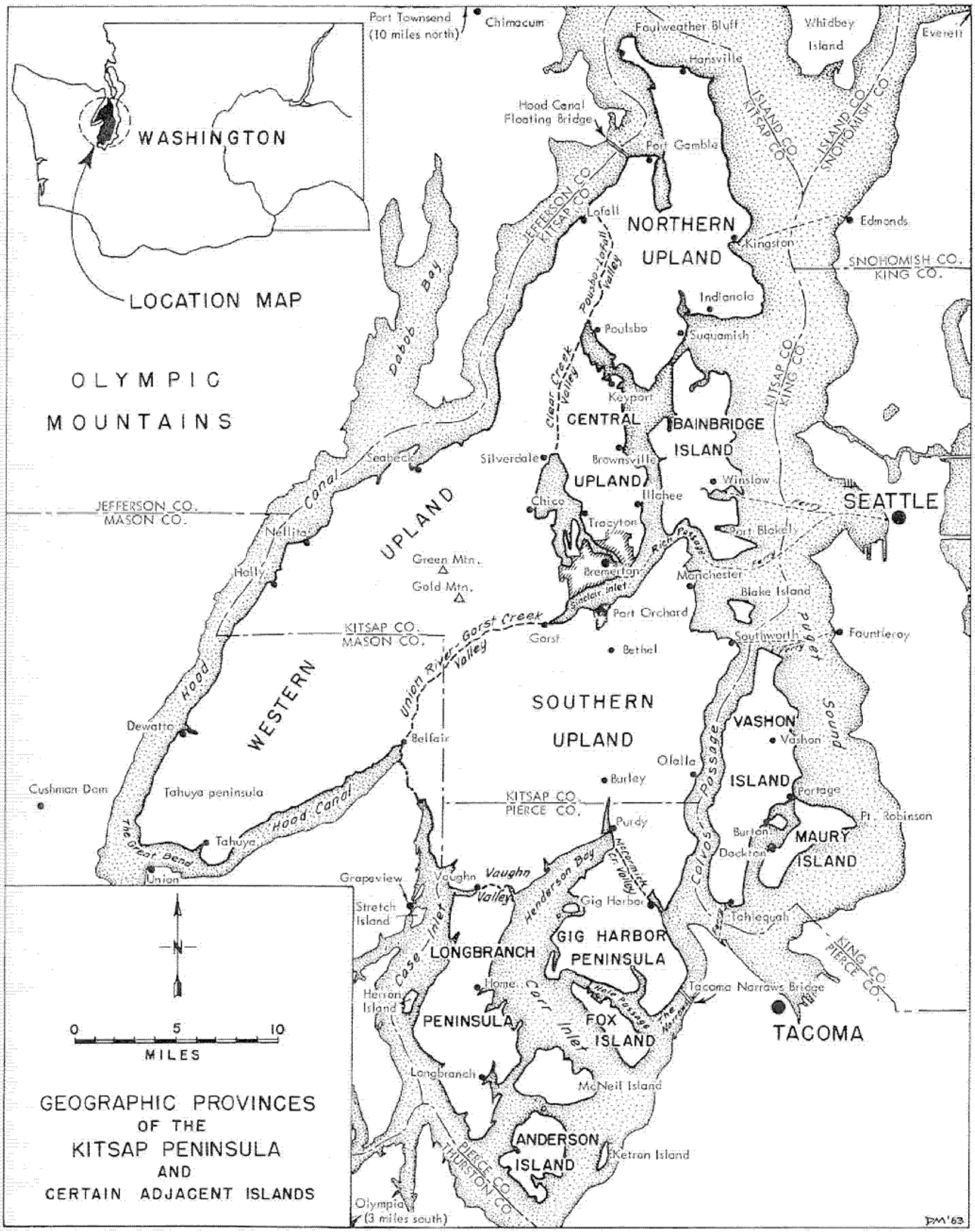



Figure 1.

DNR-00005392

# CHARACTERISTICS OF THE REGION

## PHYSICAL DESCRIPTION

By Dee Molenaar

### PHYSIOGRAPHY

Kitsap Peninsula and certain adjacent islands lie entirely within the Puget Trough section of the Pacific Border physiographic province (Fenneman, 1917, p. 95). The Puget Trough is a long northward-trending lowland between the Cascade Mountains on the east and the Olympic Mountains and the Coast Range on the west, and extends from the central part of western Oregon into Canada. Its northern section within the State of Washington contains the marine embayments known collectively as Puget Sound. These embayments occupy a drainage system that has been greatly modified by glaciation.

Most of the land area of the Puget Sound region consists of remnants of a glacial drift plain. The surface is composed generally of low, flat-topped rolling hills and ridges separated by valleys and marine embayments. The land areas generally rise to altitudes of 400 to 600 feet and range in size from small islands of less than a square mile in area to uplands of several hundred square miles. Most of the slopes from the upland areas to Puget Sound are quite steep. Wave cutting at the foot of the slopes has in places produced sea cliffs which are as much as several hundred feet high.

The Green Mountain-Gold Mountain area west of Bremerton is a rugged group of hills which cover about 20 square miles. They are composed of volcanic rocks and, related as outliers to the Olympic Mountains, rise as an "island" above the surrounding plateau surface to a maximum altitude of 1,761 feet. Their individual hills are separated by steep-walled canyons which have been eroded to depths as great as 1,000 feet.

### VEGETATION

The original virgin forests that covered the study area a little more than 100 years ago have now been more completely harvested than those of any other area in the Douglas fir region of western Washington and Oregon. This has been due primarily to the accessibility of the peninsular and insular areas to tidewater and to the highly-developed lumber-manufacturing centers of Puget Sound. With such favorable conditions, logging began at an early date and has progressed until only a few small scattered parcels of original stand remain. Only about a third of the remaining saw-timber volume is today composed of old-growth timber.

The virgin timber growth consisted dominantly of Douglas fir, interspersed with western hemlock, spruce, western red cedar, willow, alder, Oregon maple, vine maple, and madrona. Conifers and deciduous trees have reseeded in most of the cut-over or fire-scarred areas and have attained a growth for future utilization. The undergrowth is a luxuriant and dense tangle of many different plants, some of which grow to heights ranging from 4 to 6 feet. It consists mainly of salal, ferns, huckleberry bushes, Oregon grape, rhododendron, vines, and coarse grasses. Fireweed is common over cleared and burned-over areas. Many of the marshy areas are treeless, and the principal growth in such places includes mosses, cranberry bushes, wire grass, reeds, rushes, sedges, ferns, and other water-loving plants. Conifers dominate the forests on the deep sandy soils and deciduous trees are common on soils with a higher water-holding capacity. In the wetter sections, alder grows abundantly, interspersed among the evergreens, and in some such areas second-growth alder is the domiant tree.

### GEOGRAPHIC PROVINCES

In this report the area has been divided into nine geographic provinces as shown on Figure 1. These provinces include the northern upland, central upland, Bainbridge Island, western upland, southern upland, Vashon-Maury Islands, Gig Harbor peninsula-Fox Island, Longbranch peninsula, and Anderson Island.

#### NORTHERN UPLAND

The northern upland is bounded on the west by Hood Canal and the Poulsbo-Lofall valley, on the east by Puget Sound proper, and on the south by Liberty Bay, Port Orchard and Port Madison. The maximum altitude is about 520 feet but most of the land area ranges from 200 to 400 feet above sea level. The province is separated from the northern part of the western upland by a narrow drainage channel which extends from Liberty Bay at Poulsbo to Lofall. The upland is drained by short streams that discharge into the surrounding marine waters.

#### CENTRAL UPLAND

The central upland comprises the Manette peninsula and is separated from the western upland by the southwest-trending Clear Creek valley. The upland has a maximum altitude of about 480 feet. Drainage of the province is similar to that of the northern upland.

#### BAINBRIDGE ISLAND

Bainbridge Island (27.6 square miles) is a roughly rectangular island. Its highest point, east of Fort Ward, has an altitude of 425 feet and the altitude of most of the island is 200 to 300 feet above sea level. As with the central and northern uplands drainage is by small, short spring-fed streams that discharge into the Puget Sound.

## WESTERN UPLAND

The western upland includes the entire western part of Kitsap County and the Tahuya peninsula part of Mason County. Excluding the Green Mountain-Gold Mountain hills, the altitude of the surface is generally from 300 to 600 feet above sea level. Drainage of the southern part of the upland is primarily by the Tahuya and Union Rivers and Mission and Dewatto Creeks, while the northern and eastern areas are drained primarily by Big Beef Creek and Wildcat Creek. Numerous short streams also drain the peripheries of the upland along Hood Canal. Most of these streams occupy steep, narrow canyons and gullies. Numerous small lakes occupy depressions in the southern part of the western upland. The western upland is separated from the southern upland by the former glacial-outwash channel which is now occupied by Union River and Gorst Creek, from the central upland by the Clear Creek valley and from the northern upland by the Poulsbo-Lofall valley.

## SOUTHERN UPLAND

The southern upland is a large, irregular-shaped rolling area that occupies the south part of Kitsap County and includes the northwestern peninsular part of Pierce County and a narrow strip along the northeastern edge of Mason County. It is bounded on the north by Sinclair Inlet, on the west by the Union River-Gorst Creek valley and North Bay of Case Inlet, on the east by Puget Sound proper and Colvos Passage, and on the south by Vaughn valley, Henderson Bay and McCormick Creek valley. Its surface generally ranges in altitude from 300 to 450 feet, but rises to a maximum of 525 feet. Its chief land forms are broad flat-topped hills and ridges. Included in the southern upland is Blake Island (0.78 square mile) which lies in Puget Sound north of Harper.

The area is drained by many small creeks and several large streams, chief among these being Blackjack Creek and Curley Creek which drain northward to Sinclair Inlet and Yukon Harbor, respectively, Olalla Creek which drains eastward to Colvos Passage, Minter Creek, Burley Creek and Crescent Creek which drain southward into Henderson Bay and Gig Harbor, and Coulter Creek and Rocky Creek which drain westward into North Bay. The southern upland also contains several lakes and numerous ponds. The largest, Long Lake, at the head of Curley Creek, lies in the east-central part of the upland close to the divide between Curley Creek and Olalla Creek. Many smaller lakes and ponds are located in the western part of the province.

## VASHON-MAURY ISLANDS

Vashon Island (29.7 square miles) is separated from the southern upland on the west by Colvos Passage and from the mainland on the east by Puget Sound proper. Maury Island (7.04 square miles) is joined to the east side of Vashon Island by a narrow isthmus at the community of Portage near the head of Quartermaster Harbor. These two islands are the only part of the report area that lies within King County. Both islands are drained by small streams which flow into the surrounding marine waters.

## GIG HARBOR PENINSULA-FOX ISLAND

The Gig Harbor peninsula includes that part of Pierce County extending southward from the southern upland between Carr Inlet on the west and the Tacoma Narrows on the east. In this report the peninsula is defined as being separated from the southern upland by the McCormick Creek valley north of Gig Harbor. Fox Island (5.08 square miles), lying off the south end of the Gig Harbor peninsula, and reached by bridge across Hale Passage, is included in the discussion of the peninsula.

The Gig Harbor peninsula is drained by many small streams that flow into the surrounding marine waters, the largest being Artondale Creek which drains southward from the central part of the peninsula into Wollochet Bay. Fox Island is characterized by relatively gentle north slopes and generally precipitous sea cliffs along its southern and eastern margins.

## LONGBRANCH PENINSULA

The Longbranch peninsula is that part of Pierce County lying south of Vaughn valley and extending southward from the southern upland. The 12-mile long area is bounded on the west by Case Inlet and on the east by Carr Inlet. Herron Island, one mile long and a half-mile wide, lies offshore in Case Inlet and is included with this area.

The Longbranch peninsula is drained by short streams and springs that issue from its relatively steep slopes, and longer streams that drain the uplands where deeper valleys head several embayments along the shoreline.

## ANDERSON ISLAND

Anderson Island (8.10 square miles), in Pierce County, is the most southerly of the areas studied for this report. The island is located in Puget Sound one and a half miles southeast of the southern end of Longbranch peninsula. The island is characterized by relatively gentle north-facing slopes and steep southern and eastern sea cliffs. The island has a maximum elevation of approximately 280 feet above sea level. Two natural lakes, Lake Florence and Josephine Lake, occupy connected depressions on the northeastern part of the island. Drainage from the island is primarily by short streams and springs. The largest streams are the two which flow into the heads of Ora Bay and East Ora Bay.

## McNEIL ISLAND-KETRON ISLAND

McNeil Island (6.77 square miles) lies in Puget Sound north of Anderson Island and east of Longbranch peninsula. Because it is administered as a Federal penitentiary by the Department of Justice, and development of the water resources of the Island has been limited almost entirely to penitentiary needs, this report includes only the surface-water drainage characteristics and the existing reservoirs of the Island.

Ketron Island (0.36 square mile) lies off the Pierce County mainland east of Anderson Island. As the geology and ground-water resources of the island are included in the Pierce County report by K. L. Walters and G. E. Kimmel (in preparation), only the surface-water drainage characteristics are included in this present study.

## CLIMATE

By M. E. Garling

### GENERAL CIRCULATION PATTERN

The Kitsap Peninsula has a characteristically maritime climate, typified by relatively short, cool, dry summers and prolonged, mild, wet winters. Essentially, this seasonal variation results from changes in the general location of two major air masses. In the northern hemisphere, an atmospheric high-pressure area tends to persist over the northeastern part of the Pacific Ocean, while farther north, in the Gulf of Alaska, atmospheric circulation is conducive to the development of low-pressure cells. It is this major low-pressure center that generates most of the storms experienced along the west coast of North America.

In summer the "Pacific High" extends to higher latitudes as the northern hemisphere is exposed to more direct insolation and the region of low pressure and storm activity is pushed northward. As winter approaches the reverse action occurs. The low-pressure region extends southward as the "Pacific High" recedes, resulting in the occurrence of a progressively increasing number of storms at lower latitudes. These storms are commonly widespread and have paths that are often several hundred miles in width.

The flow of moisture-laden air which accompanies winter storms usually approaches the Pacific Coast of Washington from the southwest. When these storm cells reach the coast, the air-flow, depending upon location, is either (1) retarded in its movement and forced to over-ride the Olympic Mountains, Black Hills and Willapa Hills, or (2) it is funneled inland through gaps between these uplands. In the former case, where orographic features cause the air masses to rise, much of the atmospheric moisture is precipitated onto the windward slopes of the uplands causing a decided rain shadow to form on the lee side. In the latter case, where saturated air moves through the low passes, precipitation occurs at a slower rate and is more uniformly distributed along the storm path.

Climate in the report area is affected by both of these actions. In winter, the southwestern part of the Kitsap Peninsula is generally well watered because it is primarily influenced by air flow through the gap between the Olympic Mountains and Black Hills. The northern extremity of the peninsula, however, projects well into the Olympic Mountain rain shadow and enjoys much drier winter weather. In the central part of the peninsula, winter climate varies between that of the above two extremes. During summer, weather over the entire report area is dominated by the "Pacific High" and few major storm disturbances penetrate into the Puget Sound area. Precipitation during this period is generally limited to isolated shower activity, and clear sunny days usually prevail. Late spring and early fall are transitional periods between the wet and dry seasons, but the change is not well defined in the northern part of the report area.

### AVAILABLE BASIC DATA

Climatological data used in the following analysis were obtained from 5 stations within the report area and 39 stations located around the area and along the Pacific Coasts of Oregon, Washington and British Columbia.

Of those located within the report area, the Bremerton station exhibits the longest precipitation and temperature record. Data have been collected here since 1899, although a short gap occurs in the record from 1906-08. Because the gage has occupied four different locations in Bremerton during its history, the record is unreliable for use in establishing long-term trends.

The station at Madrone near Winslow on Bainbridge Island has about 21 years of precipitation and temperature record but, because these data were obtained during the period 1878 to 1899, they were of only limited value in the study.

Precipitation quantities and temperature were recorded at an unknown location in Poulsbo from 1915-21. The instruments used there were then transferred to the U.S. Navy Torpedo Station at Keyport where a sporadic record was established during the period 1921-53.

Measurements of precipitation and temperature were made on Vashon Island from 1887 to 1955, but the station location was changed seven times during this period and the record exhibits many gaps.

Because available data within the report area were generally inadequate to properly evaluate the areal distribution of precipitation, records from several nearby stations were also employed in the analysis. The most useful information was provided by the Grapeview station. This station, located on Stretch Island in Case Inlet (8 miles south of Belfair and 4 miles west of Vaughn), has been maintained primarily by one observer and provides a record with only minor interruptions at a single location dating back to 1907. The record was considered to be one of the more reliable sources of hydrologic information in the lower Puget Sound area and is employed in many subsequent investigations in the report.

Precipitation and temperature data collected at Port Townsend were most useful in establishing climatic trends near the northern part of the report area. Observations have been made here since 1857 and the records generally can be classified as good, though the station occupied two different locations during its history.

Excellent information for delineating climatic trends along the eastern boundary of the report area was provided by three U.S. Weather Bureau stations in the Seattle area. These stations, located in downtown Seattle, at Boeing-Field Airport and at Seattle-Tacoma Airport, observe several types of meteorological phenomena and their records are generally of high quality and display few interruptions. The Weather Bureau station at Olympia was also close enough to the report area to be of some value.

Other climatic stations in the Puget Sound area useful in evaluating the areal distribution of precipitation were located at Port Angeles, Sequim, Coupeville, Arlington, Chimacum, Everett, Quilcene, Quilcene Dam, Bothel, Maple Leaf Reservoir in Seattle, Cushman Dam, Union, Wauna, Kent, Shelton, Tacoma, Puyallup and Auburn. Streamflow data (p. 56) were also valuable in estimating precipitation quantities, especially in areas where no climatic data were available.

### PERIOD OF STUDY

The two basic standard periods of study to be used in most statistical hydrologic analyses in all inventory reports were established through investigations conducted at the beginning of the water resource inventory program. At that time, an examination of available data in the State of Washington revealed that climatological data were recorded at many locations prior to 1900 but most streamflow records were obtained since 1930. Though the reliability of an analysis is generally improved by incorporating as much data as possible, in order to permit valid comparisons, it is also necessary to derive statistics from a common period of record. To comply with the later requirement, most hydrologic studies would have to be restricted to the use of data obtained during the past three to four decades.

Long-term records indicated that past climatic variations generally followed the same trend, throughout the state. This similarity further justified the use of common periods of study in all reports.

In selecting a period of study, it is also important to consider the effects of storage. Discrepancies can be introduced if a difference exists between the beginning and end of the period in the amount of ground water and surface water held in storage. In dry periods, it is difficult to assess how much water is retained in storage, but the amount essentially reaches a maximum when the potential storage capacity of an area approaches complete utilization during extremely wet periods. Thus, to reduce the possibility of introducing such discrepencies, it is desirable to choose a specific period of study which both begins and ends with a year of high precipitation.

In most hydrologic investigations it is convenient to use a standard annual period of study called the water-year. Beginning with the month of October and ending the following September, the water-year in most areas is least affected by antecedent conditions and lag.

With the foregoing limitations and criteria in mind, it was reasoned that the 26 water-years of 1934 through 1959 presented a desirable period of study throughout most of the state. Weather during the 1934 water-year was generally quite wet throughout western Washington, while in eastern Washington, precipitation quantities at most stations ranked a little above normal. Similar conditions prevailed during the 1959 water-year.

To permit comparisons, it was decided that trends during the 26 years preceeding the above period would also be investigated. A cursory examination of precipitation records for several long-term stations indicated average climatic conditions in the state were quite similar during these two periods.

In analyzing hydrologic conditions in the Kitsap report area, certain investigations were based on the above outlined 26-year periods. However, in areas such as this, where available basic data are generally of short duration, the validity of analyses representing conditions during these 26-year periods is somewhat questionable. It was, therefore, decided that shorter periods of study, conforming more to the length of available record, would also be used.

Because one of the main purposes of a water resource inventory is to evaluate usable sources of supply, available streamflow records in the report area, rather than climatic records, became the prime factor in establishing the length of the shorter period of study. Continuous record streamflow data were not recorded in the Kitsap Peninsular area prior to 1945 (see p. 60), consequently the 15 water-years of 1946 through 1960 were chosen for a short-term period of study in this report.

## GENERAL CLIMATIC TRENDS

The long-term precipitation records of Port Townsend and Grapeview were selected to show differences in climatic trends between the northern and southern parts of the report area. As previously described, these records exhibit only minor interruptions and, although the Port Townsend gage occupied two different locations during its history, neither station has been moved since 1907.

Annual water-year precipitation at these stations for the period 1908-62 is shown in figure 2. The amounts of precipitation measured in each of these years during the months of October through April and May through September are also plotted for comparison. Averages for the 3 plots over the 55-year period are indicated along the right margin of figure 2. These averages are expressed in terms of inches of precipitation and the percentages that the Oct.-April and May-Sept. averages are of the mean annual water-year precipitation.

In general, quite similar trends occurred at both stations, though the mean annual precipitation at Grapeview during this period was about three times as great as that at Port Townsend. To show the similarity of trends more clearly, 10-year moving-average curves are superimposed on the above plots. These curves were established by first computing mean values for consecutive 10-year periods and then plotting the values at the midpoint of each 10-year period.

The resulting curves show that such 10-year average precipitation was lower than normal at both stations during the late 1920's and again in the early 1940's but at the Grapeview station the tendency was decidedly more pronounced during the later period. The same trends appeared in the Oct.-April and May-Sept. decadal average precipitation with the exception of the early 1940 period at Port Townsend which was about normal. In addition, the 10-year average May-Sept. precipitation during the mid 1950's tended to be slightly lower than normal at both stations. The water-year and Oct.-April curves are in close agreement during the intervening wetter-than-normal decadal periods, but the May-Sept. curves show only slight similarity to the others during these times.

Mean annual water-year precipitation at the Grapeview station during the 1908-33 period was nearly the same as that received during the more recent 26-year period, 1934-59. A significant difference, however, was found between the means for these periods at the Port Townsend station. Precipitation at Grapeview during the earlier period was lower than that of the later period by an average of 0.21 inch per year or about 0.4 percent. At Port Townsend, the earlier period also produced a lower average but the difference was greater to the extent of 0.93 inch per year or about 5.1 percent.

Precipitation averages for the shorter 1946-60 period were considerably higher than those of either long-term period. A comparison between this 15-year period and the 1934-59 period showed a difference of 2.16 inches per year or 4.2 percent at Grapeview and 0.98 inch per year or 5.4 percent at Port Townsend. (All percentages are based on 1934-59 values.)

Listed in column 4 of table 1 are values of mean annual precipitation at the two stations for seven different periods of record, including the three standard periods mentioned above. Each mean value, derived from a given sample of record, represents an estimate of the all-time or population mean at that location. (Population, as used in this sense, refers to all possible values of a variable.)

Confidence limits for the population mean, based on the data for each period and computed at a probability level of 0.95, are shown in column 5. Each expression in this column states that there is a probability of 0.95 that the computed interval will contain the population mean. For example, the first expression, $P(49.72 < u < 58.50) = 0.95$, indicates that there is a probability (P) of 0.95 that the interval from 49.72 inches to 58.50 inches, derived from data for the period 1946-60, will contain the all-time mean annual

Figure 2. WATER-YEAR, OCTOBER-APRIL AND MAY-SEPTEMBER PRECIPITATION AT PORT TOWNSEND AND GRAPEVIEW STATIONS.

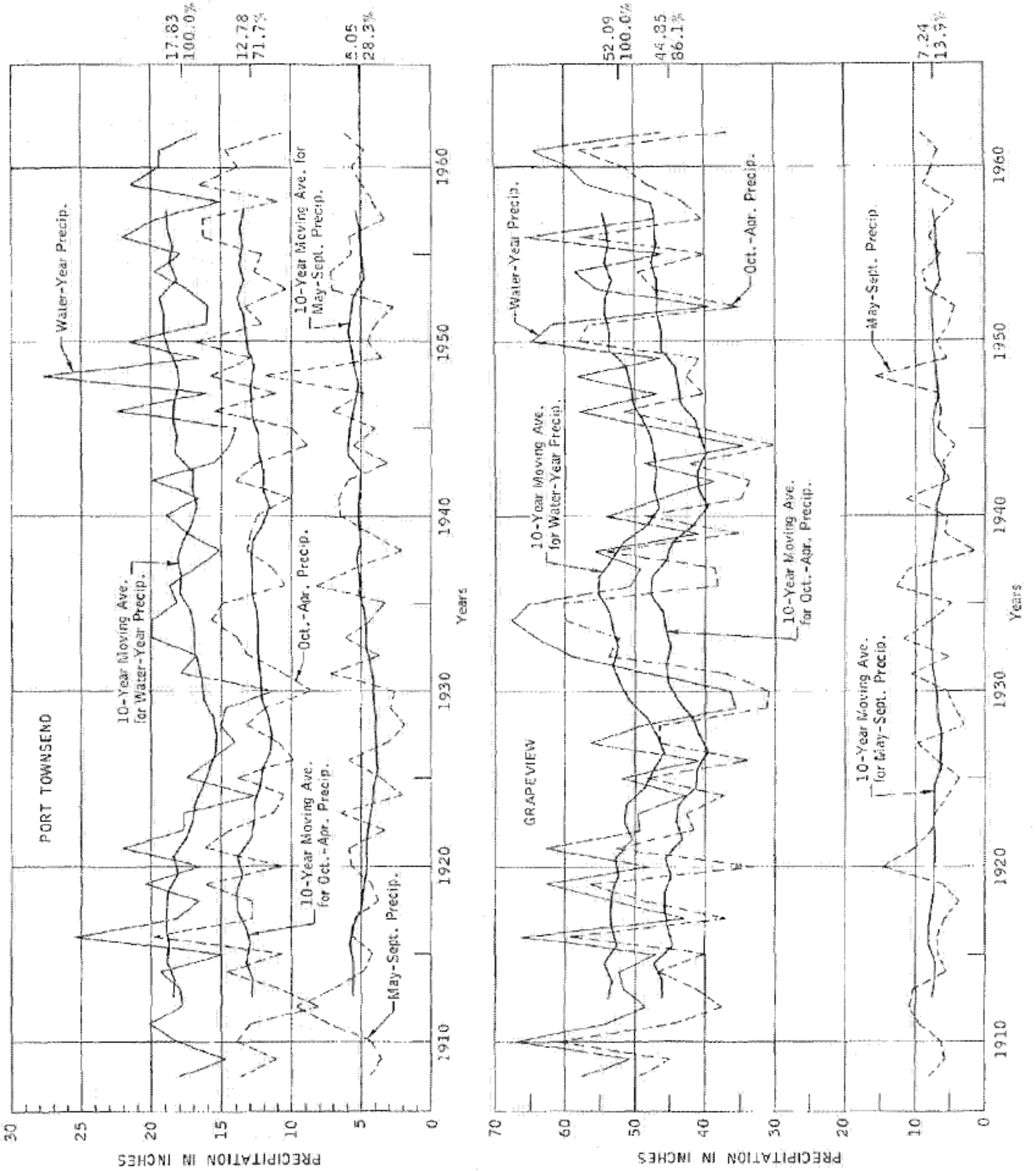


Table 1. STATISTICS SHOWING THE VARIATION OF WATER-YEAR PRECIPITATION.

| Station Location | Period of Analysis No. of Years | Period of Analysis Dates | $\bar{X}$ Mean for Period Inches | Confidence Limits for Population Mean, u Inches | S Standard Deviation Inches | 3S Three St'd. Deviations Inches | PE Probable Error Inches | CV Coeff. of Variation % |
|---|---|---|---|---|---|---|---|---|
| Grapeview | 15 | 46-60 | 54.11 | $P(49.72<u<58.50) = 0.95$ | 7.93 | 23.78 | 5.35 | 14.65 |
| | 26 | 08-33 | 51.74 | $P(48.30<u<55.18) = 0.95$ | 8.51 | 25.54 | 5.74 | 16.45 |
| | 26 | 34-59 | 51.95 | $P(48.32<u<55.58) = 0.95$ | 8.99 | 26.98 | 6.07 | 17.31 |
| | 52 | 08-59 | 51.84 | $P(49.43<u<54.25) = 0.95$ | 8.67 | 26.01 | 5.85 | 16.73 |
| | 53 | 08-60 | 51.98 | $P(49.60<u<54.36) = 0.95$ | 8.64 | 25.94 | 5.83 | 16.63 |
| | 55 | 08-62 | 52.09 | $P(49.74<u<54.44) = 0.95$ | 8.69 | 26.07 | 5.86 | 16.68 |
| | 50 | 10-59 | 51.75 | $P(49.25<u<54.25) = 0.95$ | 8.81 | 26.42 | 5.94 | 17.02 |
| Port Townsend | 15 | 46-60 | 19.24 | $P(17.36<u<21.12) = 0.95$ | 3.40 | 10.21 | 2.30 | 17.68 |
| | 26 | 08-33 | 17.33 | $P(16.13<u<18.53) = 0.95$ | 2.97 | 8.91 | 2.00 | 17.14 |
| | 26 | 34-59 | 18.26 | $P(17.01<u<19.51) = 0.95$ | 3.08 | 9.26 | 2.08 | 16.90 |
| | 52 | 08-59 | 17.79 | $P(16.95<u<18.63) = 0.95$ | 3.04 | 9.10 | 2.05 | 17.06 |
| | 53 | 08-60 | 17.82 | $P(16.99<u<18.65) = 0.95$ | 3.01 | 9.04 | 2.03 | 16.91 |
| | 55 | 08-62 | 17.83 | $P(17.03<u<18.63) = 0.95$ | 2.97 | 8.90 | 2.00 | 16.65 |
| | 50 | 10-59 | 17.85 | $P(16.98<u<18.72) = 0.95$ | 3.06 | 9.19 | 2.07 | 17.16 |

precipitation (u ) at Grapeview. The reliability of each sample mean as an estimator of the population mean is implied by the relative range of the confidence interval. In general, the reliability increases as the confidence interval for the population mean decreases.

Frequency distributions of water-year precipitation for the Grapeview and Port Townsend stations were found to be slightly skewed to the right. That is, for the water-years 1908-62, annual precipitation was below normal more often than it was above normal. At both stations below normal precipitation occurred during 30 of the 55 years; consequently, annual wet-year precipitation was somewhat more variable or extreme than annual dry-year precipitation.

The standard deviation from the mean and other associated statistics, listed in columns 6-9 of table 1 were computed for several different periods to show the amount of precipitation variability at each station. These statistics are based on the assumption that the annual precipitation at each station occurs in a normal frequency distribution. The actual distributions, as indicated above, are somewhat skewed, but for practical purposes the normal frequency distribution is a close approximation. The application of a common distribution is also desirable as it provides a standard set of statistics which can be easily compared. If the normal distribution is valid, 68 percent of all deviations both greater and less than the mean annual precipitation may be expected to fall within the limits described by the standard deviation from the mean. Conversely, in 16 percent of all cases the annual precipitation may be expected to be less than the value expressed by the mean minus one standard deviation and 16 percent of the cases may be expected to be greater than the quantity established by the mean plus one standard deviation. The values denoted by the mean plus three standard deviations and the mean minus three standard deviations indicate the range in which 99.7 percent of all the individual annual quantities of precipitation may be expected to occur. This may be interpreted as the limiting variability range for all values of annual precipitation almost without exception. The probable error, which is equal to 67.45 percent of the standard deviation, is defined as the amount of deviation from the mean that is just as likely to be exceeded as not. The coefficient of variation expresses the standard deviation in terms of a percentage of the mean.

The standard deviation from the mean for the selected periods ranged from 7.9 to 9.0 inches at Grapeview and 3.0 to 3.4 inches at Port Townsend. Though the magnitudes of these deviation statistics differ considerably between the two stations, the percentagewise variations, expressed by the coefficients of variation, are nearly identical. With the exception of the 1946-60 period at Grapeview, the coefficients of variation for both stations were all grouped between 16.5 percent and 17.6 percent. This similarity and the comparatively low value of the coefficients indicate that the entire report area is generally influenced by the same climatic regimen and the type of climate is quite consistant from year to year.

## PRECIPITATION

The areal pattern of precipitation in western Washington shows an extensive rain shadow in the lee of the Olympic Mountains. This phenomenon is barely noticeable in the lower part of Puget Sound, but to the north it intensifies, becoming most pronounced in the vicinity of Port Townsend. As a result, the northern extremity of the Kitsap Peninsula near Hansville generally experiences the lowest annual precipitation in the report area. At this location precipitation was estimated to average about 26 inches per year during the water-years, 1946-60.

An anomalous precipitation high occurs in the area of Green and Gold Mountains. Though these low mountains exhibit only moderate relief, the orographic influence is sufficient to increase precipitation by about 30 percent more than that in the surrounding area. Actual precipitation data were lacking but streamflow measurements in this area indicated a mean annual precipitation near the summits in excess of 80 inches.

With the exception of this low mountainous area, annual precipitation in the northern part of the report area gradually increases in a southwesterly direction. In the southern part there is a general increase from east to west with a maximum of about 70 inches in the southwestern part of the Western Upland. The complete areal pattern of mean annual precipitation is depicted on plate 4 in the form of an isohyetal map. The "isohyets," or lines of equal precipitation, are shown in blue and were developed from data obtained during the period 1946-60.

Existing precipitation sampling points in the report area were inadequate to establish a direct relationship between precipitation and elevation, but an analysis of streamflow data indicated that such a relationship does exist. Correlations of median basin elevation with mean annual runoff for the periods 1934-59 and 1946-60 produced identical correlation coefficients of 0.81. (A correlation coefficient of 1 represents a perfect correlation and no correlation is indicated by a coefficient of 0.)

Figure 3 shows by bar charts the mean monthly distribution of precipitation at various stations in and around the report area. All of these charts show a winter maximum and summer minimum but, percentagewise, winter precipitation is decidedly greater at the more southerly stations. The same tendency is indicated in figure 2. As shown along the right margin, the average Oct.-April contribution at Grapeview was 86.1 percent of the mean annual quantity whereas, at Port Townsend, the amount received during like periods was only 71.7 percent of the total.

The bar charts for most of the stations define a rather smooth cyclic seasonal pattern with the occurrence of a primary maximum usually during the months of December or January and a minimum, in all cases, in July. Although not always obvious, a secondary maximum also occurs in the month of June. The increase is most apparent at the stations of low annual precipitation lying in the Olympic Mountain rain shadow whereas, at the stations of higher annual precipitation, the effect is only slightly noticeable.

Precipitation in the form of snow occassionally occurs at higher elevations in the report area during the winter months, but predominantly mild temperatures produce rapid melting and the storage effect is insignificant.

## TEMPERATURE

Temperatures in the report area clearly reflect the moderating influence of Puget Sound waters and the Pacific Ocean. Only brief periods of sub-freezing weather occur in winter, and in summer, mean temperatures during the hottest months seldom exceed 70°F.

Typical trends are shown by the bar graphs of mean monthly temperature at Port Townsend and Grapeview (fig. 4). To illustrate normal variations, mean minimum and mean maximum monthly temperatures are also indicated. At both stations, the coldest mean monthly temperatures occur in the month of January and the maximum mean monthly temperatures occur in either July or August. The January temperatures are nearly identical at both stations but temperatures in July and August average about four degrees higher at Grapeview.

The range between mean minimum and mean maximum temperatures is about the same at both stations in winter, but toward summer this range increases and reaches a maximum in the months of July and August. Though both stations display this same general trend, at Grapeview the range between maximum and minimum increases at a faster rate and is significantly greater in the warmest months.

The highest temperature on record at Grapeview was 102°F. and occurred in both June and July. The minimum recorded temperature of 8°F. occurred in the months of January and February.

At Port Townsend the extremes were a few degrees lower. The maximum temperature at this station of 96°F. occurred in August, and the minimum of -3°F. occurred in January. In comparison, this range of 99°F. was only 4°F. greater than the range at Grapeview.

Though Port Townsend exhibits the lowest minimum temperature, the growing season at this station is normally somewhat longer than at Grapeview. Port Townsend has an average freeze-free period of 258 days per year, whereas Grapeview averages only 224 consecutive days with above freezing temperatures per year. Extremely cold temperatures in the Puget Sound area are usually caused by outbreaks of cold polar air from central British Columbia. Most of the lighter frosts, however, result from radiational cooling on calm clear nights.

## WATER BUDGET

The term "water budget", as used in this report, can be defined as a quantitative accounting of various interrelated phases of the hydrologic cycle as they vary with time. Available data do not permit such an accounting for the entire report area; however, a general picture can be obtained by studying hydrologic relationships at the Grapeview and Port Townsend stations.

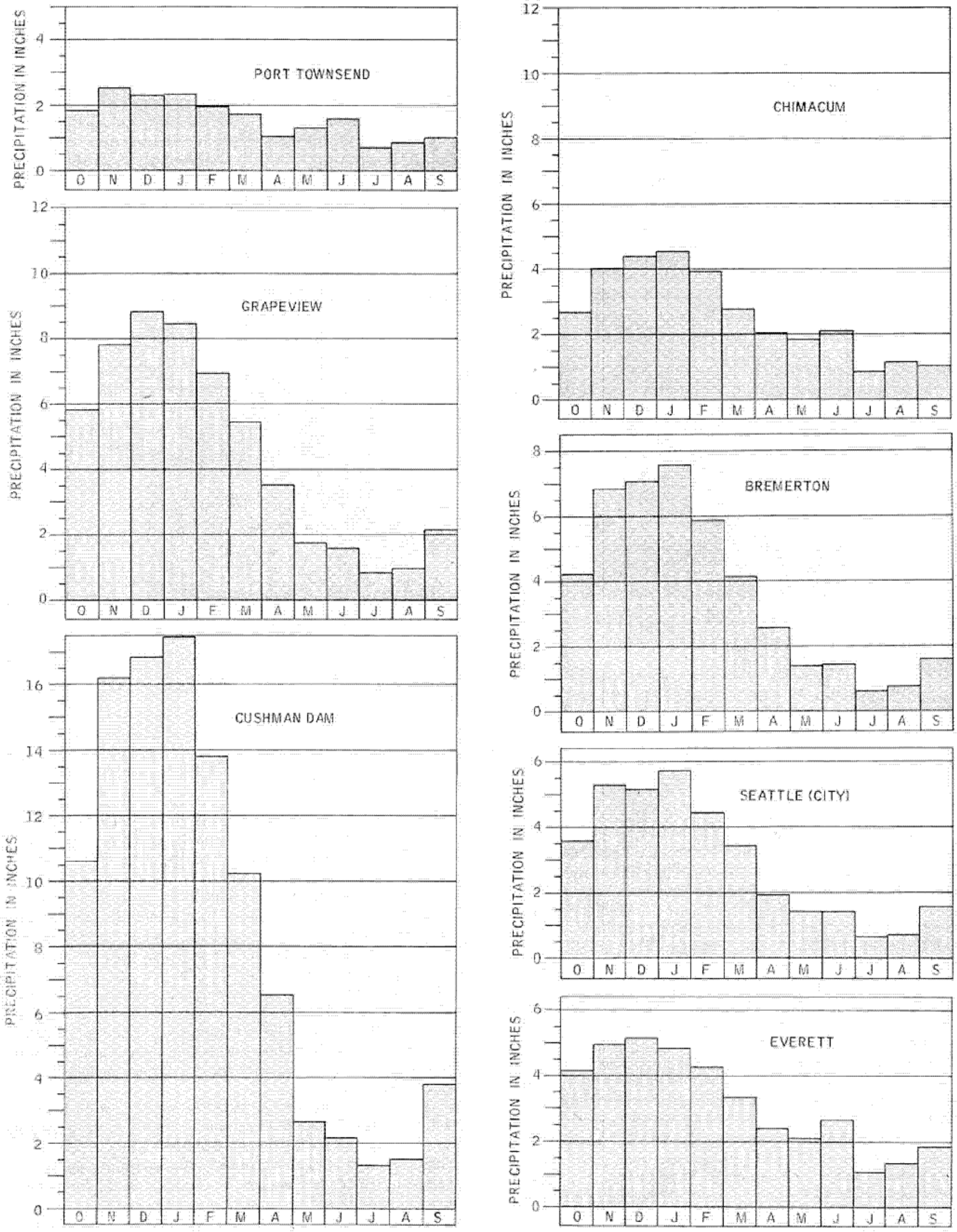
These relationships are graphically shown in figures 5, 6, 7 and 8. Curves in the upper part of each figure show the mean daily procession of precipitation and evapotranspiration and how these quantities are associated with soil moisture and runoff. Ordinates to these curves represent inches of water per day. The lower group of curves in each figure represent cumulative or mass totals of the quantities described by the upper curves. All of the curves have time in days as their abscissa, though only the monthly divisions are shown.

As previously discussed, the curves of mean daily precipitation for both stations show the characteristic pattern of a primary winter maximum followed by a secondary rise in June and a summer minimum. At Port Townsend, however, the secondary June rise is nearly as great as the subdued winter maximum.

Evapotranspriation quantities, which include both direct evaporation from water surfaces and transpiration from plant life, were computed by the Thornthwaite procedure (Thornthwaite, 1957; Wash. Div. Water Resources, 1960, p. 15). This method is based on an empirical relationship between temperature and latitude, and utilizes only conventional climatological data. Because evapotranspiration is mainly dependent on available insolation, it is potentially greatest in mid-summer and varies in direct opposition to the trend of precipitation.

At Grapeview, January precipitation is approximately 14 times greater than the concurrent potential evapotranspiration. During the following months, however, this difference rapidly diminishes and the two quantities become equal near the end of April. In the mass curve analysis, the time of equality is established when the slopes of the cumulative curves are identical. This time can also be found by locating the point of tangency (1) between the shifted mass curve of potential evapotranspiration (curve AB) and the mass curve of precipitation.

Figure 3. MEAN MONTHLY PRECIPITATION AT VARIOUS STATIONS FOR THE PERIOD 1946-60*




*See figure 1 for station locations

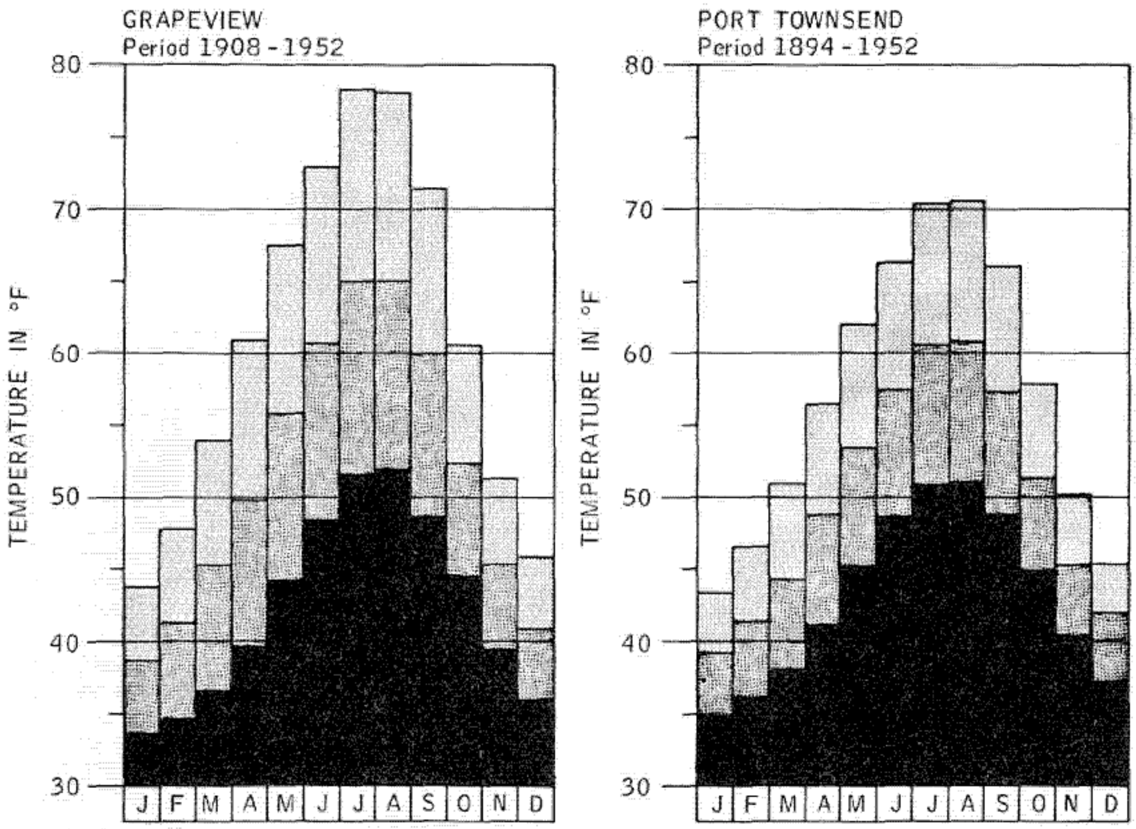



Figure 4. MEAN, MEAN MINIMUM AND MEAN MAXIMUM MONTHLY TEMPERATURES AT PORT TOWNSEND AND GRAPEVIEW STATIONS.

Throughout the summer, potential evapotranspiration exceeds precipitation. At the beginning of May the soil is essentially saturated to its full field capacity; consequently, during the first week or so in this month there normally is enough precipitation and soil moisture available to meet the demands of potential evapotranspiration. Thereafter, as soil moisture is slowly depleted, the available supply can no longer meet these demands and actual evapotranspiration falls well below the potential. During this time a so-called water deficit is said to exist. The extent of this deficit is represented by the difference between the actual and potential evapotranspiration curves. The difference between the precipitation and actual evapotranspiration curves is a measure of the soil moisture depletion or utilization during this period. At any time the total amount of deficit or soil moisture utilization can be determined from the respective mass curves of these quantities.

The availability of soil moisture for evapotranspiration varies considerably with soil type and root zone depth. To show the effects of these variables the water budget at each station was analyzed for two extreme soil moisture conditions. The type of soils and vegetation indicated that 10 inches of water would be about the maximum capacity of any root zone in the report area. This condition is shown in figures 5 and 7. The minimum water holding capacity of a root zone was assumed to be 2 inches and the resulting water budgets are shown in figures 6 and 8.

About the last week in September, precipitation at Grapeview again becomes greater than potential evapotranspiration. Most of the excess precipitation, occurring immediately after this time, is absorbed by the moisture deficient soil. Assuming that no runoff occurs until soil moisture is completely replenished, it will take about a month to recharge the 2 inch water capacity soil and over 1½ months for the 10 inch water capacity soil. The time when recharge is complete is established when the shifted mass curves of actual evapotranspiration (curves AC on all figures) cross the mass curves of precipitation at (2).

The precipitation that exceeds evapotranspiration from the end of the period of soil moisture recharge to the beginning of the next deficit period is termed water surplus. This quantity appears primarily as runoff, but a portion may be retained in surface or underground storage. Also, during both the water surplus and soil moisture recharge periods, actual evapotranspiration is essentially equivalent to the potential.

Since mean temperatures are quite uniform throughout the report area, the potential evapotranspiration curve for Port Townsend is nearly identical to that of Grapeview; consequently, Port Townsend experiences a shorter water surplus period and a longer deficit period.

Soils with a root zone capacity of 2 inches at Port Townsend can normally be fully recharged during the water surplus period but there is insufficient excess precipitation during the entire year to completely recharge a 10-inch water capacity soil. It is, therefore, possible that some soils in this area might never reach their field-moisture capacity.

## ECONOMICS OF THE REGION

By Dee Molenaar and M. E. Garling

### HISTORY

The first white man to visit Kitsap Peninsula was the English explorer, Capt. George Vancouver, who in 1792 discovered, explored, mapped, and named many of the embayments of Puget Sound. Settlement of the territory was not made, however, until about a half-century later. Until about 1850, when pioneers began to take up homesteads, the only white persons were transient explorers and fur traders, and the Indians were the only residents. Early white settlements were along the shorelines of the peninsula and islands while the interior uplands were only sparsely settled. A number of small settlements and villages were established and platted throughout the area between 1850 and 1870. Most early settlers, mainly of Scandinavian, German, and English descent, came from the Eastern and Midwestern States. Following World War I the population was augmented to some extent by immigrants from northern Europe. At present, the farming population consists mainly of descendents of the early settlers and people who have recently established themselves in the rural sections. World War II brought on considerable growth of the area as a result of servicemen from other parts of the country settling in the Puget Sound region along with the continued development of Bremerton as "home of the Pacific Fleet." Today, the economy of the Kitsap Peninsula is based primarily upon services and trades associated with the Bremerton Naval Base and Shipyard, and to a lesser extent on forest products and agriculture.

### POPULATION

Based on 1962 census figures, it is estimated that the study area has a population of about 105,000. This amounts to a population density of approximately 157 persons per square mile. This is more than 3.6 times the state-wide average of 43 persons per square mile. Of the total, more than 86,000 people live in Kitsap County proper, most of these residing in the Bremerton metropolitan area. Five incorporated cities exist in the report area, all but Bremerton having populations of less than 4000 persons.

### INCORPORATED CITIES AND TOWNS

#### Bremerton

About 1890 the U.S. Navy Department began a search for a suitable site to establish a naval shipyard on the Pacific Coast. After a congressional commission recommended the Port Orchard Bay area, Congress approved the location and appropriated $5000 to acquire land along the north shore of Sinclair Inlet. Here, near the platted town of Bremerton, the Naval Base was established in 1891 and construction was started on the first drydock, a 750-foot long wooden structure.

As operations expanded and employment grew, the town rapidly spread around the base and in 1901 Bremerton was incorporated. Beginning with the Spanish-American War, each major conflict produced an upsurge in Navy Yard employment and a corresponding growth in Bremerton's population until today about 37,000 of Kitsap County's 86,000 people live in this city and approximately another 30,000 reside in the surrounding metropolitan area. Although there have been periods of economic decline between major wars, Bremerton has enjoyed a constant growth and today it ranks as the sixth largest city in the State. The municipality has a complete school system, including Olympic College, which serves the peninsular area. Bremerton also maintains a library, daily newspaper, radio station, and two hospitals.

Except for a rock quarry, sand and gravel mining operations, and some lumbering activity, Navy Yard work completely dominates the area's industrial economy. Nearly all commercial services, trades and local agriculture have been developed in support of the Navy Yard and its large employment. Recent addition of new facilities at the Navy Yard, including the largest drydock in the world, should have a noticeable effect on the economic growth of the region.

Business statistics show that the average household income for Bremerton is about $6200 per year or about $1900 per capita per year.

Bremerton's central location and high population concentration have caused the city to become the main center of commerce for the Kitsap Peninsula. The Peninsula's major highways pass through Bremerton and water transportation to Seattle is provided by the Washington State Ferry System.

#### Port Orchard

In 1885 Sidney Stevens came to the Puget Sound region from Illinois and settled along the south shore of Sinclair Inlet. There he purchased and subdivided land and established the townsite of Sidney. Several lumber mills began operating in the vicinity and soon Sidney became the main center of trade. Establishment of the Naval Shipyard across the inlet in 1891 had a major impact on the area's economy and much of the lumber used to construct that facility came from the mills around Sidney. In 1892 the people of the county voted to change the location of the county seat from Port Madison to Sidney and in 1903 Sidney was renamed Port Orchard. In addition to sawmills and the shipyard, early industry in Port Orchard included a steam-operated shingle mill and a terra-cotta pottery plant. Later many of the local industries were destroyed by fire and today the economy is based primarily on the Puget Sound Naval Shipyard.

Port Orchard is the center of commerce for southeastern Kitsap County and is supported by a variety of activities beside the shipyard, such as dairying, raising of livestock and poultry, growing of berries, fruits, bulbs, holly and Christmas trees, and harvesting, packing and shipping of cascara bark, huckleberry, salal, sword fern and cedar boughs for use in floral displays.

Before an adequate highway system was developed, Port Orchard was a main terminal for water-borne traffic between the peninsula and the mainland, but today the harbor facilities are utilized primarily by pleasure craft. A sizeable marina and

Figure 5. MEAN ANNUAL WATER BUDGET AT GRAPEVIEW - ROOT ZONE WATER HOLDING CAPACITY OF 10 INCHES.

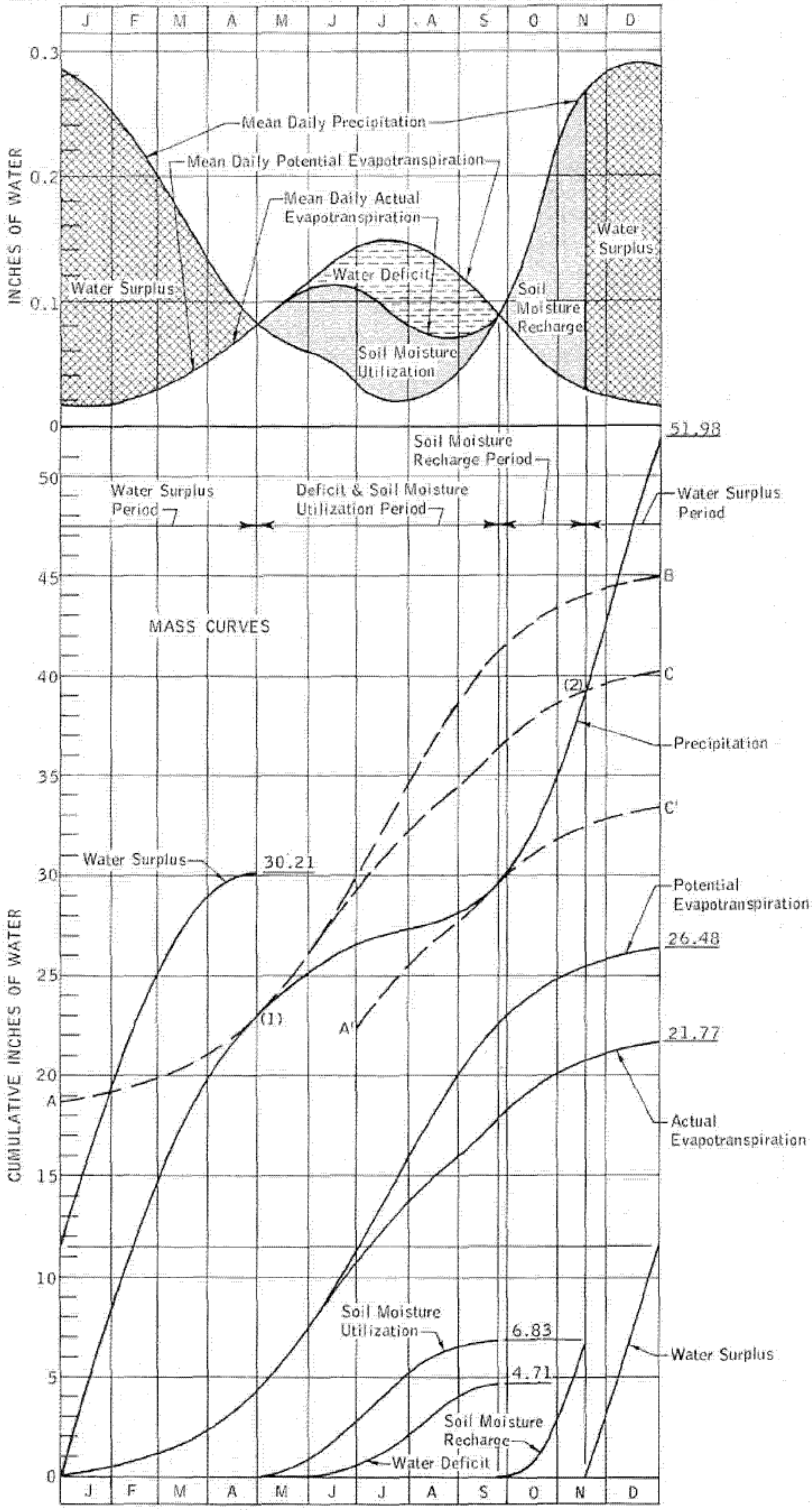


Figure 6. MEAN ANNUAL WATER BUDGET AT GRAPEVIEW - ROOT ZONE WATER HOLDING CAPACITY OF 2 INCHES.

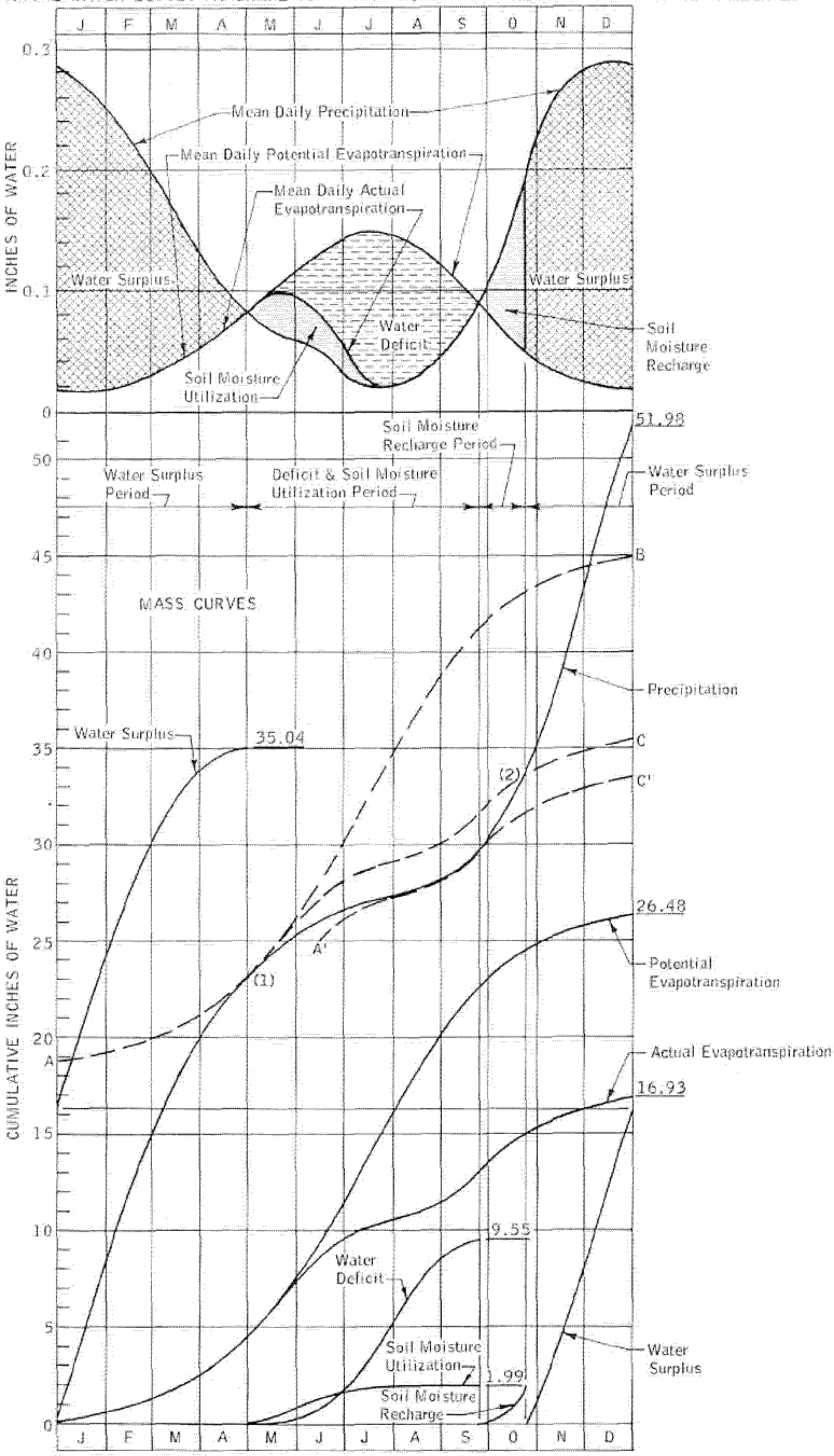


Figure 7. MEAN ANNUAL WATER BUDGET AT PORT TOWNSEND - ROOT ZONE WATER HOLDING CAPACITY OF 10 INCHES.

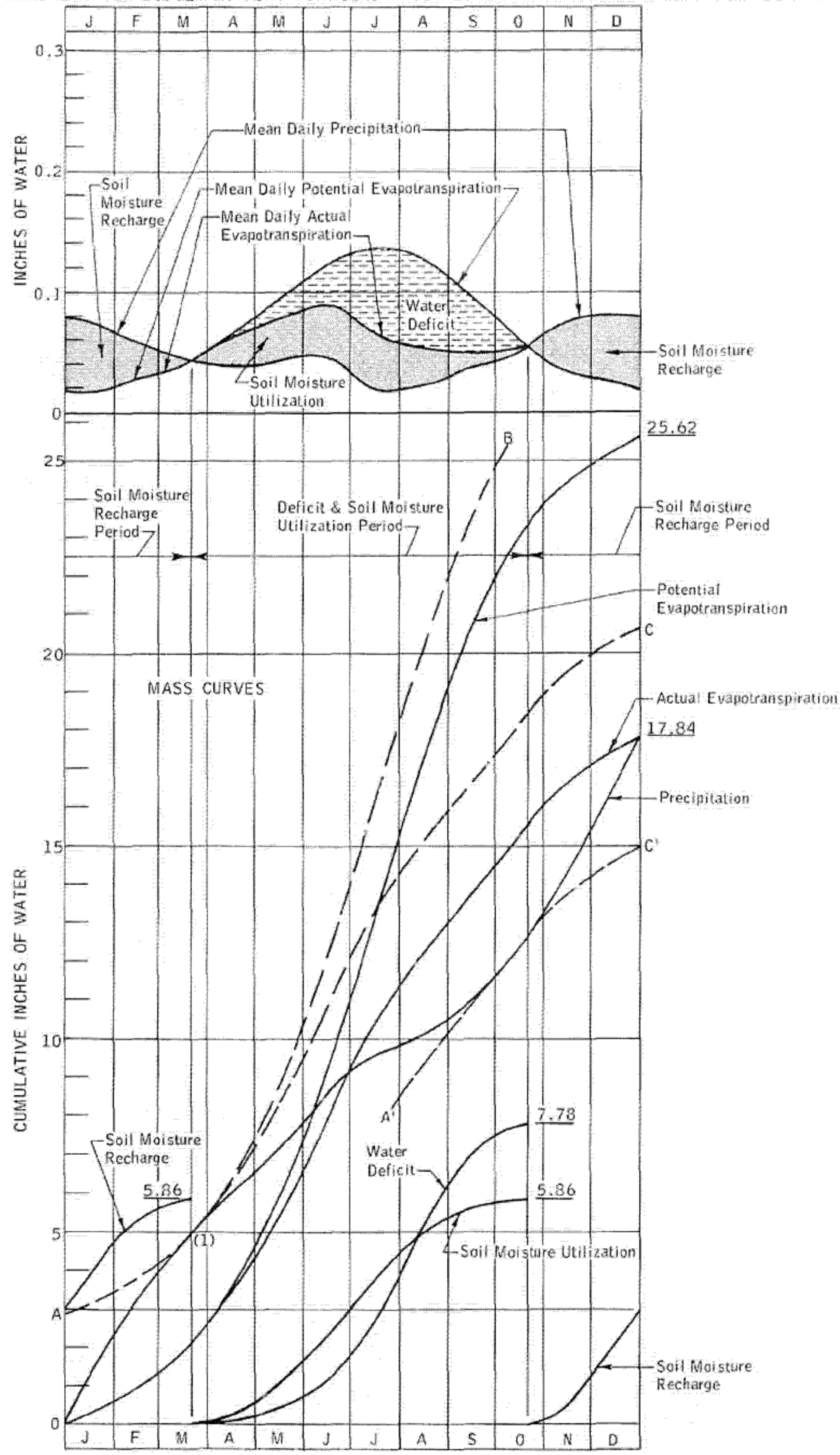
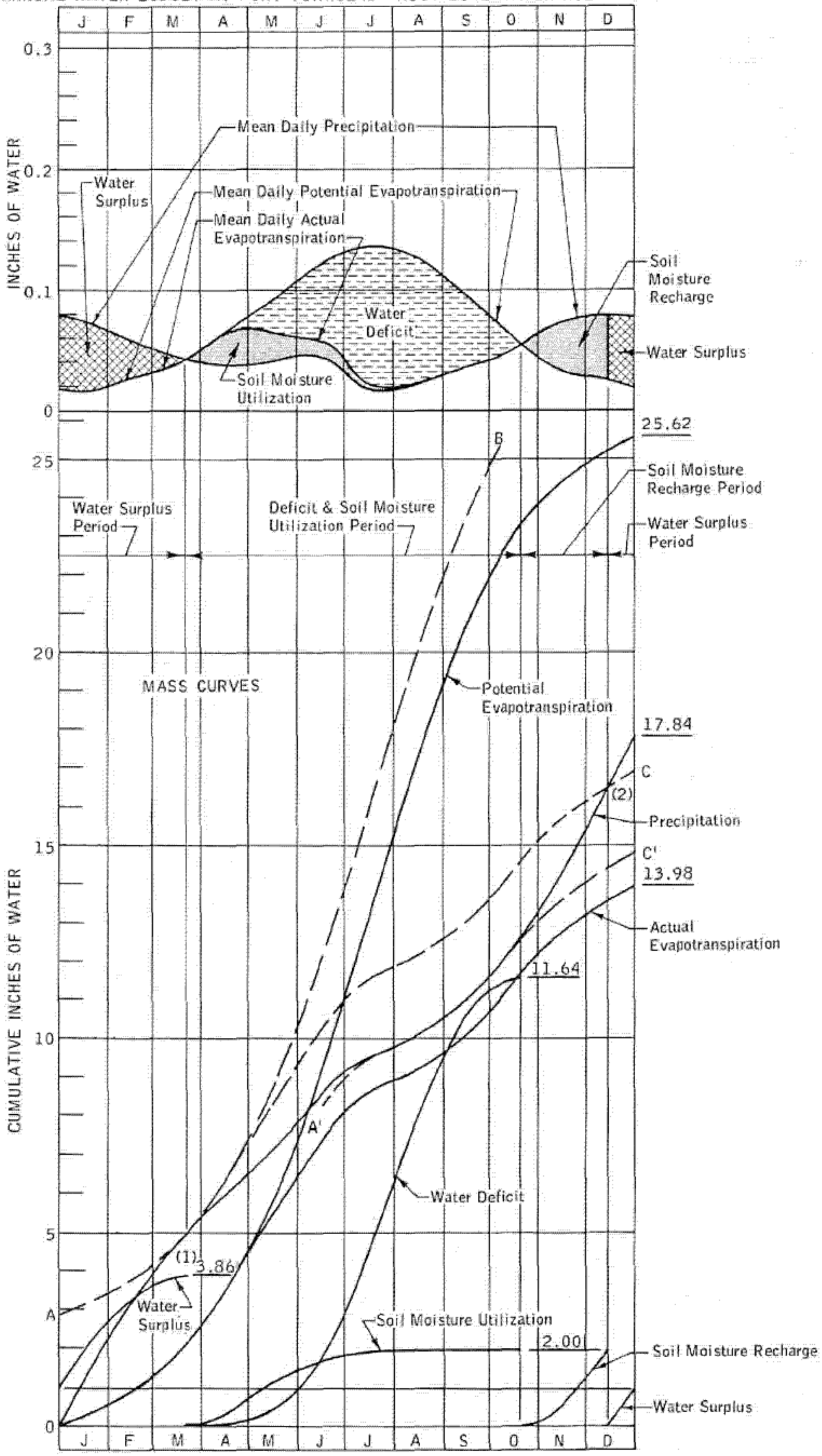


Figure 8. MEAN ANNUAL WATER BUDGET AT PORT TOWNSEND - ROOT ZONE WATER HOLDING CAPACITY OF 2 INCHES.



yacht club have been established in the area, along with a small boat-building works.

Administrative offices of Kitsap County government, along with local branches of various state and federal agencies, are housed at Port Orchard. A large veterans' home and hospital is maintained in nearby Annapolis.

Based on census figures, Port Orchard enjoyed a 20 percent increase in population during the 1950-1960 period and now has about 3300 residents.

### Poulsbo

In the late 1800's Poulsbo was settled as an agricultural trade center for the northern part of Kitsap County. The town grew slowly until 1914 when a naval ordinance depot was established by the federal government at nearby Keyport. Most of the personnel stationed at Keyport made their homes in Poulsbo, resulting in an accentuated growth of the community. The base has been used as a torpedo testing station, and in 1944 an ammunition depot was established at Bangor, a few miles to the west. Poulsbo has two oyster companies, a dairy, a meat curing plant, a bulk oil station, and a large marina for pleasure craft and a few fishing boats. The town supports a sizeable business district and has recently become popular as a residence for retired people.

In the 10-year period from 1950 to 1960 Poulsbo enjoyed more than a 48 percent population increase and presently has almost 1600 residents.

### Gig Harbor

Soon after reconstruction of the Tacoma Narrows Bridge in 1950 the Gig Harbor peninsula in Pierce County developed into a popular residential suburb of Tacoma. The harbor area has several large marinas, primarily for use of pleasure craft, and also has moorage facilities for boats operated by a commercial fish and oyster company. A small boat-building plant, a gravel company, a bulk-oil plant and a shipping station for huckleberry, salal and fern boughs all help support the economy of the Gig Harbor area.

Census figures indicate that the population of Gig Harbor has increased over 36 percent from 1950 to 1960, and presently the town has a population of nearly 1200 residents.

### Winslow

Settlement of Bainbridge Island began in the 1850's and gradually the island developed into a summer resort area for people residing in Seattle. When reliable ferry service was established with the mainland, an increasing number of people became permanent residents on Bainbridge Island and soon the island became known as "Seattle's Bedroom."

The town of Winslow was established at the main ferry terminal site at Eagle Harbor and owes its existence almost entirely to commuter traffic. As highway transportation was improved, Winslow developed a sizeable business district and the town is now the commercial center of Bainbridge Island. An important strawberry and raspberry growing industry has developed on the island and much of this produce is processed by a berry canning, packing and freezing plant located at Winslow. Located across Eagle Harbor from Winslow is the community of Creosote, so named because of a large wood-preservative plant which specializes in the creosote treatment of piling and power poles. Winslow also has a small shipyard, although it is not in operation at present.

Similar to the rapid growth of many other small towns in the report area, Winslow experienced a 44 percent population increase from 1950 to 1960 and now has a population of about 1000 residents.

## UNINCORPORATED TOWNS AND RURAL AREAS

Numerous small unincorporated towns and communities are located throughout the report area, primarily as shoreline and harbor resorts and suburban centers. The desirability of waterfront property for its aesthetic value and recreational use has been primarily responsible for the recent rapid growth of such communities. Several older communities owe their existence to earlier establishment as logging and lumbering centers.

### Northern Upland

Port Gamble was established in 1853 by Pope and Talbott Lumber Company. The accessibility and abundance of large timber so near the tidal front where the milling and shipping of lumber was easily facilitated resulted in the rapid growth of this town. After the original stand of virgin timber had been removed, the town's economy was bolstered by establishment of the Hood Canal Tree Farm which today provides a sustained yield of timber. The completion of the Hood Canal Floating Bridge in August, 1961, has helped considerably in bringing Port Gamble in closer contact with the mainlands on each side of Puget Sound, and will undoubtedly add to the economy and growth of the area.

Hansville, near the north end of Kitsap Peninsula, owes its origin to the establishment in 1880 of the government lighthouse at Point No Point a mile and a half to the east. The lighthouse is now operated by the U.S. Coast Guard. The small community first developed as a fishing and logging center, but today bases its economy primarily upon summer resort trade. The upland south of the beach community has been logged off in most places and today supports several dairy farms.

Kingston, on the east shore of the northern upland, is a ferry terminal for cross-Sound traffic between Edmonds and the Olympic Peninsula. Numerous small dairy, poultry and berry farms are located on the upland above the town.

Indianola, formerly named Kitsap, is located on the shore of Port Madison in the southern part of the northern upland. Once a terminal for ferries from Seattle, the town is today primarily a resort community and a residential area for commuters who work in Bremerton or on the mainland in Snohomish and King Counties.

Suquamish, like Indianola once a ferry terminal for Seattle cross-Sound traffic, is today primarily a resort and residential community on Port Madison. Nearby, Old Man House, a State historic site, attracts summer visitors interested in the early Indian culture of the Puget Sound region.

### Central Upland

The largest unincorporated town on the central upland is Manette, known today as East Bremerton. In 1930, Port Washington Narrows, the channel separating Manette from

Bremerton, was bridged and the residentially developed upland has since been linked with the shipyard economy of Bremerton.

Tracyton, like Manette a residential suburb for many working in the Bremerton shipyard, is also supported by local dairy and berry farms, a fox farm, and has experienced rapid residential growth.

Brownsville and Illahee, two communities located on the east shoreline of the upland, are primarily residential suburbs of the Bremerton area. Illahee State Park offers camping, picnicking and water sports during the summer season.

Keyport was originally developed as a small farming community near the mouth of Liberty Bay. However, in 1910 a government-appointed commission of navy officers selected the area as a site for a torpedo station and by 1914 much of the privately-owned land had been condemned for construction of the government facilities.

## Bainbridge Island

Aside from the incorporated town of Winslow, only a few small shoreline communities are located on Bainbridge Island. These include Creosote, Lynwood Center, Fletcher Bay and Manzanita. Small shopping centers located here provide the local markets for these resort and residential communities.

## Western Upland

The western upland is sparsely populated except for the well-developed residential areas around Bremerton, Chico and Silverdale located along the shores of Dyes Inlet, and a few isolated beach resort areas on Hood Canal such as Lofall, Seabeck, Tahuya and Belfair. The interior of the upland has a few scattered communities such as Camp Union, but is generally unpopulated, with only a few asphalt-surfaced roads serving the area. Most of the Mason County part of the western upland is covered by a loose network of gravelled roads. Many of these are improved logging roads that follow rather circuitous routes across the logged-off, unpopulated area. A few dairy farms are located along the valley bottoms of the lower parts of the major stream valleys.

The Silverdale-Chico area along Dyes Inlet has developed primarily as a residential suburb of Bremerton. Numerous small farms, which produce eggs, poultry and dairy products, are located on the upland and in the Clear Creek valley adjacent to Silverdale.

Lofall, on Hood Canal at the northern end of the western upland, is a small residential community which, prior to the completion of the Hood Canal Bridge in 1961, was the only ferry terminal linking the Peninsula to the Olympic Peninsula on the west.

Seabeck, Holly, Dewatto and Tahuya are the principal shoreline communities developed along Hood Canal. Although a large number of residents are permanent, the economies of these communities are bolstered considerably by summer resort businesses. Dewatto is a small fishing community that also serves as a log collection center for logging operations along Hood Canal. Holly, so named because of its holly growing and harvesting business, is now predominantly a resort community, with a few permanent residents. Nellita, formerly a sawmill community, is today primarily the home of a few retired residents. The shoreline of Hood Canal from Tahuya eastward to Belfair is almost entirely developed by waterfront residences and summer resorts. Belfair State Park is a major attraction during the summer season, with camping, picnicking and water sport facilities.

The Union River-Gorst Creek valley is occupied by small farms and permanent homes for people who work in the Bremerton-Port Orchard areas.

## Southern Upland

The southern upland is populated mostly in the northern part, along Sinclair Inlet in the Port Orchard-Annapolis area, and along Puget Sound in the Manchester-Harper-Southworth area. The Purdy-Burley area and Gig Harbor area in the southern part of the upland have also developed somewhat as farming and residential communities. Most of the southern upland's farmsteads are located in the broader upland valleys of Burley Creek, Blackjack Creek and in the Olalla Creek-Long Lake-Curley Creek valley, with the uplands adjacent to these valleys containing a few scattered farms. Beach homes and summer resorts are located along Colvos Passage, Henderson Bay and Case Inlet.

Aside from the incorporated towns of Port Orchard and Gig Harbor, the major smaller communities are those of Manchester and Harper on Yukon Harbor, Belfair at the head of Hood Canal, Vaughn on Case Inlet, and Burley and Purdy at the head of Henderson Bay. The community of Bethel south of Port Orchard is the only significant center of residential development on the upland. Although most of the shoreline communities originated as logging and lumbering centers, they have since been developed primarily as waterfront residential areas dependent upon retirement incomes, summer resort business, and upon payroll incomes derived from employment in the nearby cities of Tacoma, Bremerton and Port Orchard. The community of Purdy is the site of an oyster canning business, a state pollution control laboratory, and the Peninsula Union High School and nearby Burley produces poultry, dairy products and strawberries.

## Vashon-Maury Islands

Much of the economy of Vashon and Maury Islands is derived from commuting residents working in Seattle and Tacoma. Although in the earlier days of water transportation the island business was centered in the community of Burton on Quartermaster Harbor, today's business center has moved inland to the unincorporated town of Vashon. Here are located several small businesses that manufacture such products as tachometers, veterinarian supplies, fiberglass boat hulls and nose cones for military missiles. Also located near the town of Vashon is a large greenhouse. West of town a large orchard produces cherries, apples and pears. Strawberries and cherries are the principal agricultural exports of the island and holly is also raised commercially. Poultry farming is a major industry and over 1,000,000 crates of eggs are shipped annually from Vashon Island. Two radio transmitting stations are located on Vashon Island.

Maury Island is developed principally along its northwestern shoreline by waterfront homes which have access to the protected waters of Quartermaster Harbor. A golf course and county park at Dockton provide recreational facilities on the island. The only large industry is that of a sand and gravel company. This operation has cut deeply into the gravel deposits of the island's precipitous south sea cliff. A radio station has transmitting tower facilities on Maury Island near the community of Portage.

The shorelines of the islands have several small residential and resort communities. These include the ferry terminals of Vashon Heights at the north end where connection is made with Fauntleroy in Seattle and Southworth, and Tahlequah at the south end where ferry connection is made with Tacoma. Other shoreline communities include Burton, Ellisport, Dockton, Portage, Cove, Colvos, and Lizabeula.

### Gig Harbor Peninsula-Fox Island

The Gig Harbor peninsula and Fox Island are populated primarily by suburban commuters employed in Tacoma. Reached by the Narrows Bridge, these areas have been developed principally by small upland farms, beach homes and shoreline communities. The town of Gig Harbor is at present the business and population center of the peninsula, although development of the upland adjacent to State Highway 14 north of the Narrows Bridge is rapidly expanding with residential and shopping centers. As of 1963, the upland west of the bridge is being cleared and leveled for the proposed Tacoma Municipal Airport. Fox Island has experienced increasing residential growth with completion of the bridge across Hale Passage in 1954.

Among the small unincorporated communities of this area are Artondale at the head of Wollochet Bay, Rosedale on Carr Inlet, and Arletta on Hale Passage. Kopachuck State Park, located north of Horsehead Bay on Carr Inlet, offers summer camping and picnicking facilities.

### Longbranch Peninsula

The Longbranch peninsula, like other upland areas of the report area, has been almost completely logged off with second-growth timber now predominating between the few scattered farms that occupy the cleared areas. The unincorporated shoreline communities of Key Center, Home, Longbranch and Vaughn are the residential centers of the peninsula. A privately owned ferry system operates between the peninsula and Herron Island in Case Inlet. To a lesser extent than on Gig Harbor peninsula and Fox Island, residents commute daily to Tacoma via the Narrows Bridge. Huckleberry and holly are exported from Home. The economy is aided by summer resort business with several marinas offering boating facilities. Penrose Point State Park offers camping, picnicking, and clam digging to summer visitors.

### Anderson Island

Reached by ferry from Steilacoom on the Pierce County mainland, Anderson Island is developed only moderately by a few beach homes and summer cabins located primarily along the north shoreline adjacent to the ferry dock, at Amsterdam Bay on the west shore and on the Lyle Point peninsula at Ora Bay. A few small farmsteads are located on the uplands, but the interior of the island is otherwise characterized by uncleared second growth timberland. In earlier days a brick manufacturing industry operated in the Ora Bay area, but today the economy of Anderson Island is based upon development as a commuter suburb of Tacoma.

## AGRICULTURE

Early settlements on the Kitsap Peninsula were dependent primarily upon trade with the mainland for their existence, but as more land was cleared, a diversified agriculture developed to satisfy the growing local market. Though of less importance than the shipyard and the forest products industries, agriculture has progressed steadily and presently occupies an important place in the area's economy.

The best agricultural lands on the Kitsap Peninsula and nearby islands are found along the major alluvial-filled stream valleys and throughout much of Bainbridge Island. The agricultural soils are mainly class 3 sandy Alderwood loams and Kitsap silt loams, and are classified as being moderately good (Wildermuth and others, 1934). Other areas are mantled with glacially-derived soils of the Everett and Indianola loam groups and are classified as being excessively droughty.

Most farms in the area are medium to small in size primarily because of high land values, varied topography and sharply differing soil types. Many of the farms are operated on a part-time basis by residents who are employed full time elsewhere. In general, the farms are quite diversified in their output which includes dairy and poultry products, livestock, hay, silage, grains, berries, fruits and vegetables.

## MANUFACTURING

Ship construction with associated repair and maintenance is the most important industry on the Kitsap Peninsula. Figures obtained in 1950 show that nearly 40 percent of the employed population in Kitsap County were engaged in manufacturing, and most of these people worked at the Puget Sound Naval Shipyard at Bremerton. This operation is directly dependent upon federal funds and to a great extent controls the economy of the area.

Other small scale manufacturing operations consist of several boat-building firms, a concrete pipe and septic tank construction plant, an aluminum door and window frame manufacturer, several ceramic shops, a trailer manufacturing firm, and several smaller manufacturing companies.

## FOREST PRODUCTS

The first lumber mills were established on the Kitsap Peninsula at Port Gamble, Seabeck and Waterman in the early 1850's. Gradually the vast stands of easily accessible virgin timber were removed from the surrounding areas.

The relative importance of lumbering began to decline after the naval shipyard was established at Bremerton, although today the lumbering industry is still of economic importance to the report area. The mills at Port Gamble and Bremerton are presently the largest operators, although more than 25 smaller mills and approximately 150 logging firms operate throughout the peninsula.

Second-growth timber is today utilized for pulpwood, lumber, poles and piling and these are the most important forest products of the area. In recent years Christmas tree growing and brush picking for use in floral displays have also become important secondary forest industries.

## MINERALS

Proven mineral deposits in the Kitsap Peninsula area have been insignificant and of little economic value with one exception. The vast glacial deposits of sand and gravel found throughout the area are of considerable importance, and aggregate washing and grading plants are found at several locations. Andesite and basalt rock used for various purposes is quarried adjacent to the Bremerton-Gorst highway and at several places in the hills west of Bremerton. Certain clay mineral deposits offer some potential for manufacturing of cement and for refractory purposes, but to date these have not been exploited.

## FISHERIES

Commercial fishing boats operate from the Kitsap Peninsula's many ports and harbors, but in general the fishing activity within the report area has declined. Salmon and other saltwater food fish are found throughout the waters of Puget Sound, but commercial fishing activities have been generally restricted to the larger fishing grounds north of the peninsula.

Shellfish are found throughout the waters of the Kitsap Peninsula and oysters are grown commercially at several locations, primarily in the quiet waters of the more southerly inlets.

Many streams on the peninsula are utilized by anadromous fish (plate 5) and the Washington State Department of Fisheries maintains an important experiment station and salmon hatchery near the mouth of Minter Creek.

## RECREATION

Situated between the Olympic and Cascade mountains and bounded by several hundred miles of saltwater shoreline, the Kitsap Peninsula affords an excellent combination of recreational opportunities and scenic beauty. Many permanent residents of the area and summer vacationers own attractive waterfront homes. In recent years the development of new resorts and tourist accomodations, catering primarily to fishing and boating activities, have added considerably to the peninsula's economic stability and growth.

# GEOLOGY AND GROUND-WATER RESOURCES

By Dee Molenaar

## WELL AND LOCATION-NUMBERING SYSTEM

In this report wells and locations are designated by symbols that indicate their locations according to the official rectangular public-land survey. For example, in the symbol 24/1E-33K1, representing one of the City of Bremerton's wells, the part preceding the hyphen indicates successively the township and range (T. 24 N., R. 1 E.) north and east of the Willamette Meridian and Baseline. Because the report area lies entirely north of the Willamette Baseline the letter indicating the direction north is omitted, but the letters "E" or "W" are included to describe the range's position east or west of the Willamette Meridian. The first number following the hyphen indicates the section (Sec. 33), and the letter "K" gives the 40-acre subdivision of the section, as shown in Figure 9.

The last number is the serial number of the well in the particular 40-acre tract, if more than one well is listed. Thus, well 24/1E-33K1 is in the NW¼SE¼, Sec. 33, T. 24 N., R. 1 E. and is the first well in the tract to be listed.

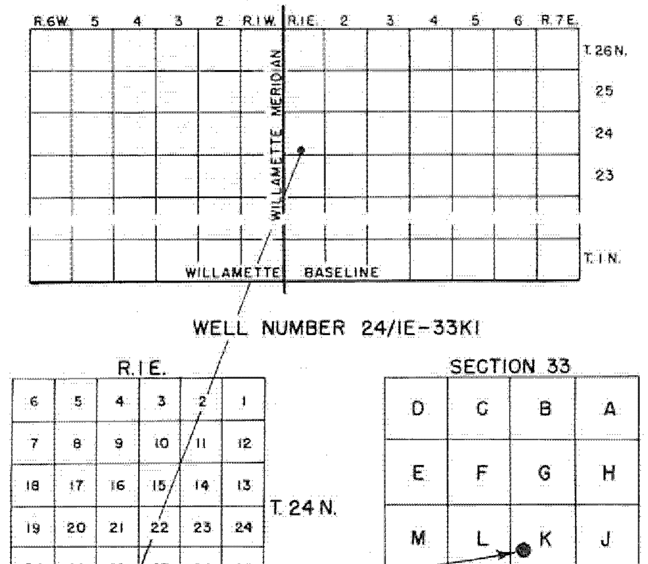



Figure 9. DIAGRAM SHOWING WELL AND LOCATION-NUMBERING SYSTEM

## GEOLOGY OF THE REGION

### GEOLOGIC HISTORY

A knowledge of the sequence of geologic events that formed the various rock units within the report area will give an understanding of the extent and occurrence of these formations, which in turn will aid in understanding the occurrence of ground water within the area. As the oldest rocks found on the Kitsap Peninsula are of Tertiary Age, the following discussion will cover only the sequence of geologic events of the Tertiary Period through the Quaternary Period.

### TERTIARY PERIOD

During the early and middle Eocene Epoch of the Tertiary Period great thicknesses of basaltic and andesitic lavas were extruded from fissures or cones and were laid down across a broad, northwest-southeast trending piedmont plain that occupied most of what is now western and southwestern Washington. A fluctuating sea level and shoreline at that time caused portions of the plain to lie alternately above and below sea level, resulting in deposition of some of the lavas in marine waters. Stream sediments derived from the volcanic rocks were also deposited throughout the area, some forming interbeds and lenses between lava rock units. By late Eocene time the volcanic activity had decreased considerably and a period of quiescence followed, during which time, and extending through the Oligocene and early Miocene Epochs, thousands of feet of marine sedimentary rocks accumulated on top of the volcanic rocks.

During late Miocene time the volcanic and sedimentary formations were deformed into large northwest-southeast trending folds, producing the ancestral Cascade Mountains. Erosion during early to middle Pliocene time reduced these mountains considerably. At the close of Tertiary time, during the late Pliocene Epoch, a north-south uplift produced the present Cascade and Olympic Mountains, with an accompanying downwarp between forming the present Puget Trough (Fenneman, 1931, p.450).

### QUATERNARY PERIOD

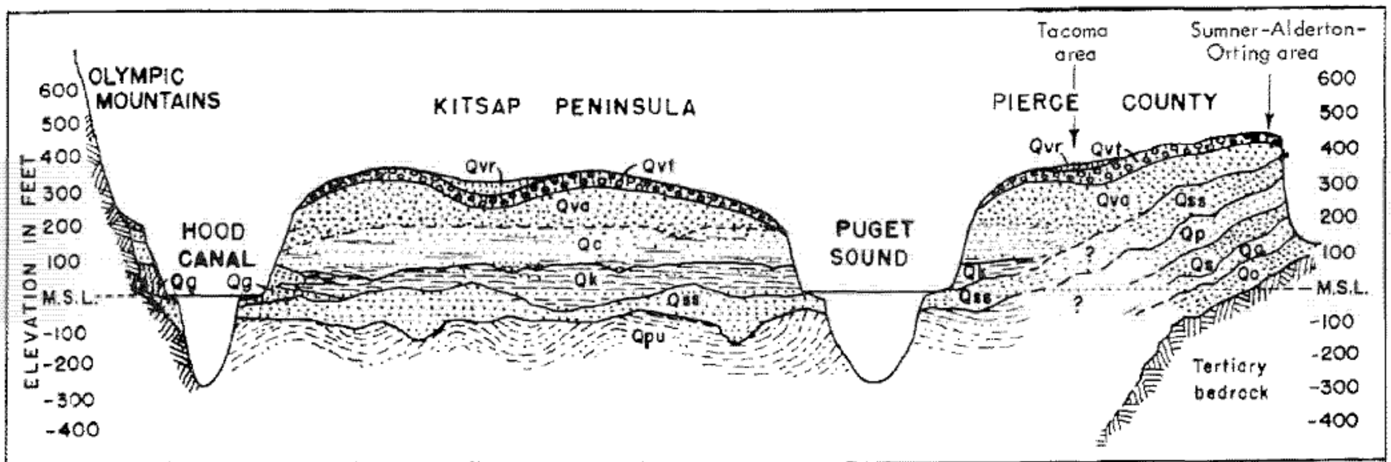
#### Pleistocene Epoch

During late Pliocene and through most of Pleistocene time what is now the Puget Sound lowland was the site of deposition of sedimentary materials. These sediments consist principally of varying thicknesses of fine-grained silts and clays, alternating with coarser sands and gravels. The finer sediments are believed to have accumulated in fresh-water lakes and swamps. Thin strata of volcanic ash found in the finer-grained materials indicate that some volcanic activity was occurring in nearby areas during this time. Woody materials accumulated locally in shallow lakes or swamps, resulting in the lenses and beds of peat and lignite found today. The coarser materials were laid down both as stream deposits from bordering mountain valleys and as glacial drift materials laid down by several large ice sheets which occupied the Puget Sound lowland during the Pleistocene Epoch.

During the Pleistocene "Ice Age" vast glaciers originating in Canada pushed several times into the Puget Sound lowland. Ice sheets 2000 to 5000 feet thick covered the area as far south as the vicinity of Tenino in southern Thurston County. A fluctuating climate caused the ice mass to alternately grow and advance, and melt and "retreat," several times during Pleistocene time, with the last ice disappearing from the report area approximately 14,000 years ago.

From the front of each glacier issued large streams which deposited sands and gravels, and in many places cut new channels and valleys for later filling by such sediments. Fine silts and clays were deposited in lakes formed locally in ice-dammed drainages. Warming of the climate for long periods caused large scale retreats of the ice from the area and permitted the growth of vegetation and even forest cover similar to that of the present day. As the climate again cooled and ice again invaded the lowland areas, these forest and swamp materials were buried under the stream and glacial deposits and are today found as compacted peat beds lying within clay and silt materials. A primary deposit associated with each glacier advance is till or "hardpan," normally a gray to bluish-gray, compact mixture of cobbles in a binder of silt and clay. This material was "smeared" along as a basal deposit of each ice sheet and mantled the pre-existing topography over which the ice advanced.

Each period of glacial advance into the Puget Sound lowland was followed by glacial retreat and subsequent erosion of some of the glacial drift materials. Because much of the depositional record was thus destroyed, it is difficult to determine the number of times that major ice sheets entered the lowland, particularly during the early and middle Pleistocene Epoch. However, since publication of the report on the geology of Kitsap County (Sceva, 1957), several additional field investigations have been made of the complex stratigraphy of Quaternary sediments found in various parts of the Puget Sound lowland. These studies have resulted in considerable modification of earlier concepts held on the number and sequences of glacial and nonglacial stages within the Pleistocene Epoch. According to Crandell and others (1958) who studied the Pleistocene stratigraphy of the Sumner-Alderton-Orting area in Pierce County, the earlier concept of two major glaciations must now be replaced by one that allows for at




| KITSAP PENINSULA | DEPOSITIONAL INTERVAL | PIERCE COUNTY MAINLAND (Crandell & Others, 1958; Walters & Kimmel, in preparation) |
|---|---|---|
| Vashon Drift: Qvr-recessional outwash, Qvt-till, Qva-advance outwash, Qc-Colvos Sand | Fraser glaciation | Vashon Drift: Qvr-recessional outwash, Qvt-till, Qva-advance outwash |
| Qg -unnamed gravel / Qk-Kitsap Formation | Olympia interglaciation | Qk-Kitsap Formation |
| Qss-Salmon Springs(?) Drift | Salmon Springs glaciation | Qss-Salmon Springs Drift |
| Qpu-pre-Salmon Springs(?) deposits, undifferentiated | Puyallup interglaciation | Qp-Puyallup Formation |
| | Stuck glaciation | Qs-Stuck Drift |
| | Alderton interglaciation | Qa-Alderton Formation |
| | Orting glaciation | Qo-Orting Drift |

Figure 10. DIAGRAMMATIC WEST-EAST CROSS SECTION OF THE SOUTHERN PUGET SOUND LOWLAND, SHOWING A TENTATIVE CORRELATION BETWEEN THE PLEISTOCENE STRATIGRAPHIC UNITS OF THE KITSAP PENINSULA AND THE PIERCE COUNTY MAINLAND. The Sumner-Alderton-Orting area was studied by Crandell and others (1958), and the Tacoma area was studied by Walters and Kimmel (in preparation).

least four glaciations. These studies, and a later summary of the late Pleistocene stratigraphy and chronology of the Strait of Georgia and Puget lowland by Armstrong and others (1965), now name the following sequence of glacial and nonglacial intervals:

Fraser glaciation (youngest)
    Olympia interglaciation
Salmon Springs glaciation
    Puyallup interglaciation
Stuck glaciation
    Alderton interglaciation
Orting glaciation

In the Kitsap Peninsula area, only two readily recognizable major glacial drifts have been found by the author. The younger of these was named the Vashon Drift by Willis (1898, p. 126) and this designation has been accepted by all subsequent writers. The older of the two drifts has here been tentatively correlated to the Salmon Springs Drift (Crandell and others, 1958) but, owing to lack of direct correlation to date with the type localities near Sumner, Alderton and Orting, it was deemed advisable to identify the Drift found in the Kitsap Peninsula area with query. Figure 10 shows the writer's tentative correlation between the depositional intervals as interpreted from stratigraphic units found in the report area with those compositely described on the Pierce County mainland by Crandell and others (1958) and Walters and Kimmel (in preparation).

Warming of the climate at the close of the Salmon Springs glaciation resulted in melting and northward retreat of the ice from the lowland. The lowland sediments then became subject to erosion, reworking, and partial bevelling by streams from the adjoining Cascade and Olympic Mountains. The streams carried sediments from the mountains and deposited them across the partially eroded lowland. An aggradational floodplain was developed during this nonglacial period over most of the area now occupied by Puget Sound and the Strait of Georgia. Slow, meandering streams, shallow lakes and marshes formed the predominating environment for the deposition of fine silts, clays and peats. These materials, named the Kitsap Formation, were deposited in the report area during the Olympia interglaciation.

Following deposition of the nonglacial Kitsap Formation a cooling climate again brought on the growth of continental glaciers in the north, and a thick sequence of massive- to well-bedded proglacially deposited sand with lenses and interbeds of gravel and clay was laid down across the surface of the Kitsap Formation. In places lakes were formed and partially filled by well-bedded clays. Evidence to date fails to clearly define the depositional environment of these materials, named the Colvos Sand (see p. 33). Because the sands exhibit no general decrease in grain size southward throughout the report area, it appears that the depositional environment in which the Colvos Sand was laid down remained relatively constant, and shifted southward with the movement of a major ice sheet. Until more detailed studies are made of the Colvos Sand, the writer proposes that the sediments were laid down as a proglacial deposit at some distance beyond the advancing front of the Vashon glacier.

The Vashon glacier entered the northern Puget lowland following deposition of the Colvos Sand and overlying coarser proglacial gravels. According to radiocarbon dating of wood and peat from nonglacial deposits beneath these Vashon Drift materials, the glacier entered the north end of the Strait of Georgia in British Columbia since 25,000 years ago (Armstrong and others, 1965). The approximate date of the glacier's entry into the Kitsap Peninsula area is not established at this writing, owing to a considerable variation of radiocarbon dates obtained from sediments found directly beneath Vashon Drift throughout the Puget lowland.

The rate of southward movement of the Vashon glacier across the report area has been suggested by radiocarbon dates obtained for preglacial and postglacial peat beds found in the Seattle area by Mullineaux and others (1965). Dates from wood fragments found in nonglacial sediments lying beneath the Lawton Clay Member of the Vashon Drift indicate that nonglacial conditions prevailed at the latitude of Seattle until at least 15,000 years ago. Dates of samples taken from sediments directly overlying Vashon Drift show that the glacier had retreated from this latitude in the Kitsap Peninsula area prior to 13,500 years ago. Between these limiting dates it is shown that the ice occupied the Seattle area for no longer than 1,500 years. As this period must also allow for the deposition of advance and recessional outwash sediments the actual interval of occupancy by the Vashon glacier may have been considerably shorter.

As the glacier advanced in the Puget Sound lowland, separate ice tongues pushed into valleys existing in the pre-Vashon topography and cut these deeper while adjacent interlobe "highs" received sand and gravel deposits from streams which aggraded laterally and ahead of the separate ice tongues. As the ice thickened, the tongues coalesced and eventually covered most of the lowland. The ice continued to cut and deepen the valleys, with ice erosion penetrating deeply into the underlying materials, including the glacier's own advance outwash deposits of gravel and coarse sand, the Colvos Sand, The Kitsap Formation, and the older materials. The valleys thus cut extended 300 to 900 feet below present sea level. This depth of cutting by the ice is not extreme when one considers that the Vashon glacier attained thicknesses of 2000 to more than 4000 feet over the Kitsap Peninsula area, as indicated by the presence of glacial erratics deposited by the ice at these elevations on the adjacent flanks of the Olympic Mountains. At the maximum extent of the Vashon glaciation, the ice moved into what is now the southern part of Thurston County and butted against the foothills of the Black Hills. The materials removed by the glacial erosion of the valleys were carried southward by outwash streams and were either deposited across the southern part of the lowland or were carried into the Chehalis River drainage via the Matlock and Gate Pathways described by Bretz (1913).

Near the close of the Pleistocene Epoch the front of the Vashon glacier began to recede from the Puget Sound lowland. The uplands and hills were the first areas freed of ice. Meltwater streams flowed across the exposed areas, eroding some of the earlier deposits and redepositing these sand and gravel materials in broad channels. Deltas formed at many places where streams terminated in lakes and ponds that were impounded by ice tongues still occupying the valley areas. A series of lakes thus formed in the valleys gradually abandoned by the retreating ice front became the sites for deposition of the fine-grained thinly stratified, well-bedded clays of glacial Lake Russell (Bretz, 1910). As the ice continued to melt, the meltwater streams and levels of the impounded lakes shifted to progressively lower altitudes. Finally, upon complete disappearance of ice from the Puget Sound lowland, marine waters entered by way of the Strait of Juan De Fuca and replaced the glacial lake waters, forming the present day salt-water embayments and channels of Puget Sound.

## Recent Epoch

In Recent time deltas have formed at the mouths of the larger streams that discharged into Puget Sound. Where filled with stream sediments to above sea level, they today form the broad river bottomlands which head many of the marine embayments. Peat and silt deposits have accumulated in ponds that developed on the irregular glacial topography, and a relatively thin soil mantle has developed throughout most of the area. Postglacial streams have eroded deep canyons in the uplands, while slumping and wave erosion have steepened many of the slopes extending from the uplands to the waterways of Puget Sound. The processes of erosion of uplands, and deposition of river silts and sands into the lowlands and headwaters of the Puget Sound inlets continue through the present day.

## DESCRIPTION OF ROCK UNITS

### TERTIARY ROCKS

#### Volcanic Rocks

The oldest rocks found in the Kitsap Peninsula are the thick sequence of basaltic flows that underlie the Green Mountain-Gold Mountain hills west of Bremerton. These volcanic rocks have been correlated to rocks found on Vancouver Island, British Columbia, which were first described and named the Metchosin volcanics by Clapp (1909). Although first assigned a late Mesozoic Age, they have since been described on the Kitsap and Olympic Peninsulas of Washington as being of Eocene Age (Weaver, 1937).

In the Green Mountain-Gold Mountain hills the flows consist principally of dark, fine-grained basalt. Some flows have an amygdaloidal texture where vesicular bubble holes have become filled with secondary minerals. In the quarry at 24/1E-28 on Sinclair Inlet, several flows are discernible, with a maximum thickness of individual flows being about 30 feet.

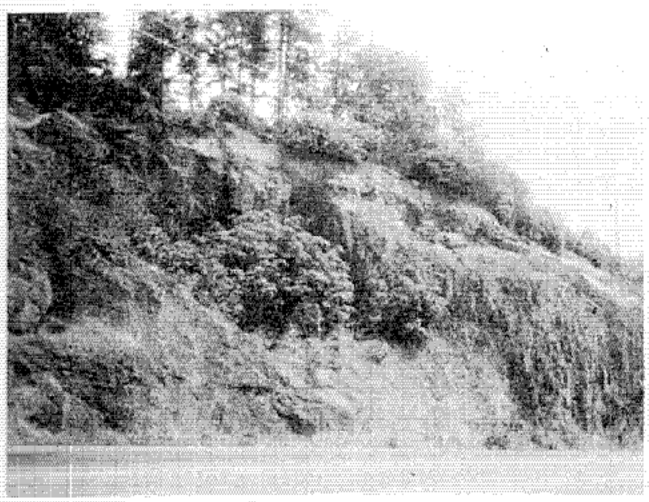


Figure 11. TERTIARY BASALT FLOWS. Exposed in road cut along Sinclair Inlet at 24/1E-28.

Associated with the flows are crystalline igneous rocks which as dikes and sills have locally intruded the finer-grained basalts. These rocks are usually coarse-grained diorite and basalt porphyry and are exposed in the quarries at 24/1W-3P and 24/1W-8A on the north slopes of Green Mountain.

The total thickness of these volcanic rocks is not known. In an oil test well at 22/1W-11J the drill encountered these rocks at a depth of 700 feet and had not passed through them at a depth of 6,688 feet (Sceva, 1957, p. 13).

#### Sedimentary Rocks

A thick sequence of well-indurated marine sedimentary rocks crops out in the sea cliffs near the southern end of Bainbridge Island, and in the opposite shore of Rich Passage from Waterman to Orchard Point. Similar rocks are also exposed in the entrance to Dyes Inlet at the western end of the Port Washington Narrows. They consist of conglomerate, sandstone, and shale composed mainly of erosional products from a volcanic terrain. These rocks were described and named the Blakeley formation by Weaver (1912, p. 10-22), who later determined their age as Oligocene. The total thickness of this formation in the report area is estimated to be more than 8,500 feet (Weaver, 1937, p. 151), although its base and upper surface are not exposed. The formation was folded and later bevelled by erosion in late Tertiary time and strata that were once practically horizontal are now inclined at angles of 45-degrees to nearly 90-degrees (Fig. 12). A marked angular unconformity exists between this formation and the overlying Pleistocene sedimentary materials.

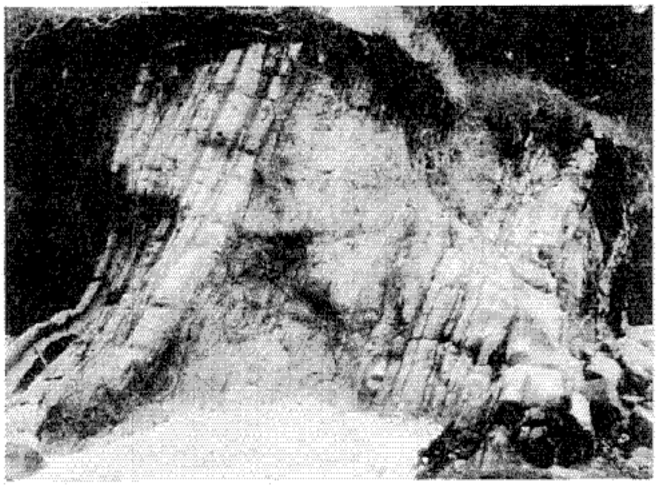


Figure 12. BLAKELEY FORMATION. Nearly vertical strata exposed above beach at 24/2E-8J northeast of Port Orchard.

### QUATERNARY DEPOSITS

#### Pre-Salmon Springs(?) Deposits, Undifferentiated

A great thickness of unconsolidated sedimentary materials overlies the Tertiary rocks in the Kitsap Peninsula and represents an accumulation of glacial and nonglacial sands, gravels, clays and till during early to middle Pleistocene time, prior to the Salmon Springs glaciation.

As observed in a number of exposures at the base of beach bluffs, and as described in drillers' logs, these sediments are composed primarily of fine-grained sands, silts, and clays which were named the Admiralty drift by Willis (1898). Owing to the recognition of a till unit within these materials the sediments were considered by Willis to be representative of a single glaciation prior to the Vashon glaciation. Bretz (1913, p. 175-177) recognized two distinct tills within the Admiralty drift but still accepted the name given the formation by Willis. As discussed earlier, subsequent studies by Crandell and others (1958) have shown evidence of at least three major glaciations prior to Vashon glaciation. The term Admiralty drift, used by Sceva (1957) to describe these older materials, has been replaced in this report by the term pre-

Salmon Springs(?) deposits, undifferentiated. This unit includes both glacial and nonglacial materials.

The upper surface of these sediments is marked by an erosional unconformity which is below sea level in most places in the Kitsap Peninsula but is exposed in a few places at the base of sea cliffs. Owing to the heavy cover of vegetation obscuring the upper surface, the top of the pre-Salmon Springs(?) deposits, undifferentiated is not readily observed in most places. However, well log data indicates the surface to be deeply eroded. Elevation differences of 300 to 400 feet are common between ancient hills and valleys.

These older sediments are exposed along the base of beach bluffs at Point Southworth and south along the west shore of Colvos Passage to a point below Fragaria. On Vashon Island, on the east shore of Colvos Passage, they are found forming a steep resistant bluff at 23/2E-26G near Cove (Fig. 13a) and also south of Lizabeula at 22/2E-14D, where they may be seen attaining a vertically tilted position probably as a result of ice shove by the Vashon glacier. The older sediments are also exposed in a small outcrop at 22/3E-19C on the north shore of Quartermaster Harbor (Fig. 13b). On the Longbranch peninsula they form the major part of the South Head peninsula 20/1E-6.

The above-described exposures consist chiefly of massive, frequently contorted strata of hard clay and silt, with horizontal, well-defined bedding rare. Where a hard, horizontally bedded clay has been found, it has been mapped with the Kitsap Formation, although it may in fact be associated with the older materials.

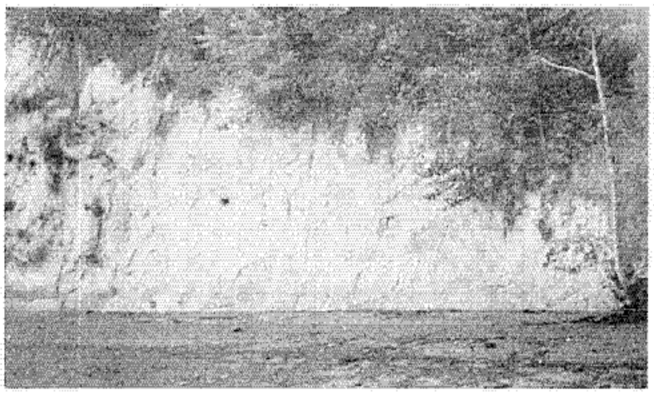
Because there are only a few exposures where the pre-Salmon Springs(?) deposits, undifferentiated can be examined, its character is known mainly from well logs. In most logs it is described as being composed of fine-grained materials, chiefly clay and fine sand, with occasional interbeds of coarser sands and gravels. In interpreting from drillers' logs it is sometimes impossible to separate soft sedimentary rocks of Tertiary Age from the overlying Pleistocene materials because of the similarity of the rock descriptions used. Many of the deeper wells in the report area have been drilled through the Pleistocene materials and continued into the Tertiary sedimentary rocks without any notation by the drillers of a change in formation. Drilling speed, which might give an indication of that break in lithology, was generally not recorded so that in many wells where the Pleistocene materials have been completely penetrated their thickness is not determinable from well logs.

## Salmon Springs(?) Drift

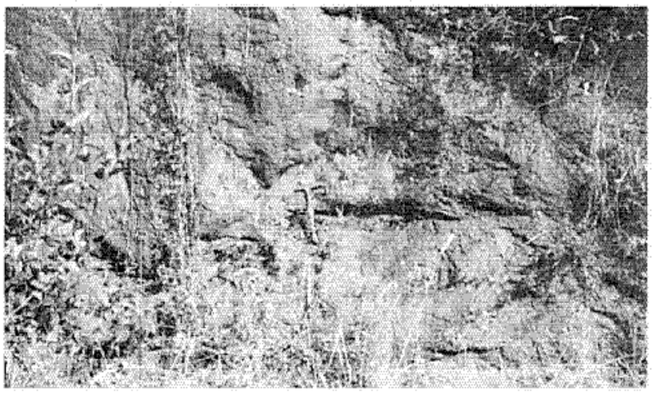
Lying unconformably upon the deeply eroded surface of the pre-Salmon Springs(?) deposits, undifferentiated, is a sequence of coarse, stream-laid gravels and sands with local occurrences of glacial till. These materials were correlated by Sceva (1957, p. 15) to the gravels studied and named the Orting gravel by Willis (1898). Because the gravels in the type locality near Orting in Pierce County grade upward into a fine-grained member (Willis, 1899), Sceva divided his Orting gravel in Kitsap County into a lower and an upper member, naming them the lower member and the Kitsap clay member of the Orting gravel (Sceva, 1957, p. 15-17). However, subsequent re-examination of the Pleistocene stratigraphy in Pierce County by Crandell and others (1958) has assigned Willis' Orting gravel to a much older glaciation than that responsible for deposition of these gravels in the Kitsap Peninsula area.

Two post-Orting, pre-Vashon glaciations have now been recognized and named by Crandell and others (1958) the Stuck and Salmon Springs glaciations. The type section of the Salmon Springs Drift has since been traced out to Browns Point northeast of Tacoma, and deposits of similar stratigraphic relationship have been subsequently mapped in the sea cliffs south of Tacoma by Walters and Kimmel (in preparation), and in Thurston County by Noble and Wallace (in preparation). These deposits are correlative with the so-called lower member of the Orting gravel named by Sceva (1957) in Kitsap County. The present writer has extended the mapping of these gravels into the southern part of the Kitsap Peninsula and has correlated these with similar deposits found in Thurston County by Noble and Wallace (in preparation). However, because of the lack of direct correlation by surface exposures with the type section in the Sumner-Orting area of Pierce County, the writer is in agreement with Noble and Wallace that it is advisable to correlate these sediments only tentatively and with reservation by naming them Salmon Springs(?) Drift.

The Salmon Springs(?) Drift is usually exposed at or slightly above the base of sea cliffs and primarily in the

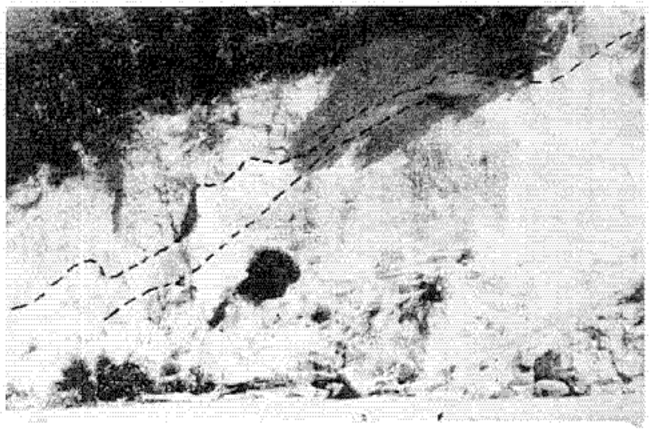


a. Base of beach bluff at Cove on Vashon Island, at 23/2E-26K.

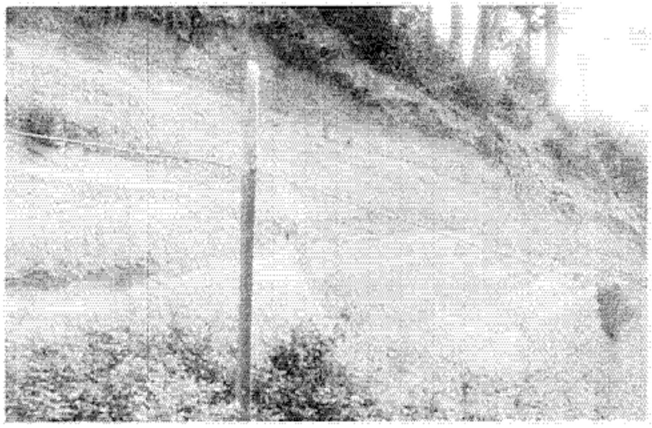


b. Above road at 22/3E-19C on Vashon Island.

Figure 13. PRE-SALMON SPRINGS(?) DEPOSITS, UNDIFFERENTIATED.



a. Salmon Springs(?) Drift gravels underlying Colvos Sand and Vashon till at 20/2E-5C near Pt. Fosdick.



b. Exposure in roadcut at 22/2E-3M near Olalla, showing Salmon Springs(?) Drift gravels unconformably underlying Colvos Sand and Vashon advance gravels.

Figure 14. SALMON SPRINGS(?) DRIFT.

southern half of the report area, chiefly as a coarse-bedded gravel sequence with lenses of finer sands and some rare till pods. The upper surface of the drift is found at elevations of 10 to 30 feet above sea level and appears in some exposures to be conformably overlain by finer sediments, grading into the silts and clays of the Kitsap Formation. Locally peat beds are observed in what appears to be upper portions of the drift, but these may belong to the nonglacial Kitsap Formation. The base of the formation is seldom observed but is believed to extend to 200 or more feet below sea level where it fills the deeper valleys cut into the surface of the pre-Salmon Springs(?) deposits, undifferentiated. The only information on the thickness of the Salmon Springs(?) Drift comes from drillers' logs, hence it is frequently difficult to mark the depth at which these sediments overlie the older deposits. Although scattered exposures are found in Kitsap County proper, the surface of the Salmon Springs(?) Drift apparently has been slightly depressed northward in the Puget Sound basin, and most of the well-defined exposures are found in the southern part of the report area. The glacial drift forms a nearly continuously exposed basal part of the sea cliffs of the southern half of Longbranch peninsula and most of Anderson Island.

In many exposures the chief characteristics which distinguish these gravels from those of the Vashon Drift are the great degree of oxidation with lends to the formation a generally rusty orange coloration, and the inclusion of granules and lenses of pumice, which are not noticeable in the Vashon Drift. The oxidation is normally of a surficial nature only and the pebbles are not noticeably decomposed, although in many places the gravels have been sufficiently oxidized to become firmly cemented together, resulting in the formation of vertical cliff faces (Fig. 14a). The sediments were partially derived from granitic and metamorphic type rocks, signifying an origin in the northern Cascades and British Columbia. Where exposed in rare outcrops the glacial till is extremely compact, in contrast to the softer overlying Vashon till. The two tills are well exposed northwest of Green Point on the Horsehead Bay peninsula, at 21/1E-28D. Here the Salmon Springs(?) till is observed rising diagonally from the base of the sea cliff to attain an elevation of about 15 feet before being truncated by the younger Vashon till; the two till sheets are separated by a well-bedded sequence of reddish sands believed to be Colvos Sand.

## Kitsap Formation

The Salmon Springs(?) Drift is overlain in most places by the Kitsap Formation which consists chiefly of clays and silts, with minor amounts of sands and gravels. Distinctive beds of peat and lignite occur at various intervals throughout the formation. The materials are of nonglacial origin. The presence of euhedral and subhedral hypersthene grains indicates a derivation from Mount Rainier and southern Cascade volcanic rock types.

Sceva (1957) assigned these deposits to the Kitsap clay member of the Orting gravel. However, these silts and clays are of nonglacial character, as opposed to the glacial outwash character of Sceva's lower member of the Orting gravel (herein named the Salmon Springs(?) Drift). Therefore, the writer, with concurrence by Noble and Wallace (in preparation), deemed it advisable to describe the Kitsap as a separate formation. The writer herewith proposes the name Kitsap Formation for this unit.

The type locality of the Kitsap Formation is a beach bluff exposure at 22/2E-9J, one-half mile north of Maplewood on the west shore of Colvos Passage. Here the formation appears to lie conformably above, and interfingers with, the Salmon Springs(?) Drift gravels. The presence of a peat-bearing silt stratum 1 to 4 feet thick about 15 feet below the top of the 55-foot sequence of predominantly reddish gravels suggests that early in the deposition of the Kitsap Formation there existed a stream depositional environment and/or the late stages of the Salmon Springs(?) Drift deposition included a lacustrine environment and a temperate climate. Such conditions would indicate a transition from a glacial to nonglacial environment at this location without an erosional interval.

In Thurston County to the south Noble and Wallace (in preparation) describe similar deposits of peat-bearing silt overlying gravels of Salmon Springs(?) Drift, between Butterball Cove and Hogum Bay along Nisqually Reach. Here is exposed about 60 feet of horizontally-bedded brown to gray silt and clay overlying 4 feet of rusty gravels just above beach level. At least three peat-bearing strata are observed in this exposure. The upper surface of the formation is generally obscured by a dense cover of vegetation.

Several sections of well exposed Pleistocene deposits were measured in the southern part of the report area and show the relationship of the Kitsap Formation to the underlying Salmon Springs(?) Drift and the overlying Colvos Sand as follows:

19/1W-2B: South end of Longbranch peninsula at Devils Head.

| Rock unit | Thickness |
|---|---|
| Vashon till | (top of bluff) |
| Colvos Sand: sand, brown, medium-grained | 10' |
| Kitsap Formation: silt, peat-bearing, with vivianite inclusions | 12' |
| Salmon Springs(?) Drift: gravel and sand, rusty | 20' |

From this point northwesterly along the west shore of Longbranch peninsula the Salmon Springs(?) Drift decreases in grain size, the Kitsap Formation thins and disappears, and farther north it is difficult to distinguish the boundary between the Salmon Springs(?) Drift and the Colvos Sand except by a slightly more oxidized coloration of the former.

19/1E-20B: South end of Anderson Island.

| Rock unit | Thickness |
|---|---|
| Vashon till | 3' |
| Colvos Sand: sand, brown, medium-grained | 10' |
| Kitsap Formation: silt, peat-bearing | 3' |
| sand, silty | 8' |
| Salmon Springs(?) Drift: gravel, rusty | 10' |
| silt, clay, peat-bearing | 2' |

Immediately west of this exposure thin strata of younger clay of glacial Lake Russell overlie the Vashon till.

21/2E-30Q: West shore, entrance to Wollochet Bay.

| Rock unit | Thickness |
|---|---|
| Vashon till | 12' |
| Colvos Sand: sand, gravel | 20' |
| Kitsap Formation: clay, peat-bearing | 3' |
| Salmon Springs(?) Drift: gravel, rusty | 20' |

20/1E-18N, P: West shore of Pitt Passage, northeast of Mahnckes Point.

| Rock unit | Thickness |
|---|---|
| Vashon till | 20' |
| Colvos Sand: sand, brown, medium-grained | 15' |
| Kitsap Formation: clay, silt, peat-bearing | 15' |
| Salmon Springs(?) Drift: sand, brown, medium-grained | 30' |

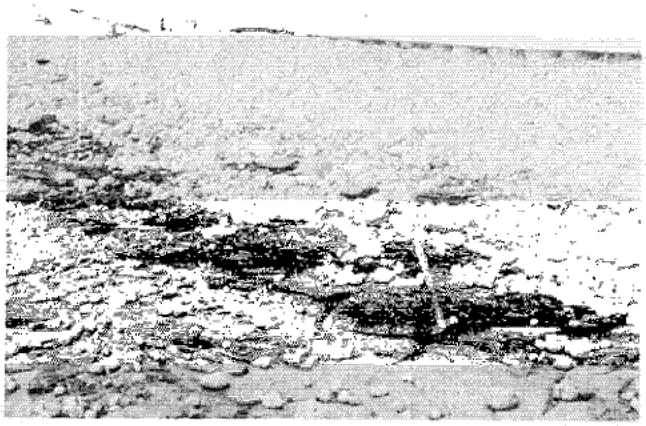
Except for interbed of Kitsap Formation here, Salmon Springs(?) Drift would have been mapped as Colvos Sand.

22/2E-9J, K: West shore of Colvos Passage, one mile south of Olalla.

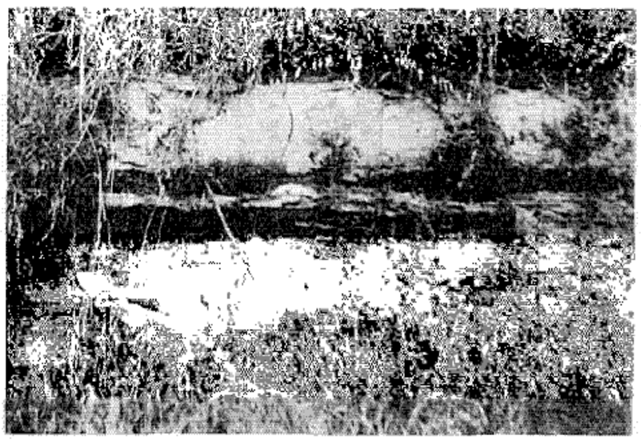
| Rock unit | Thickness |
|---|---|
| Colvos Sand: sand, reddish-brown, with silt | 40' |
| clay, blue-brown, finely bedded | 43' |
| Kitsap Formation: silt, with 2" peat stratum at top | 2' |
| Salmon Springs(?) Drift: gravel, red | 15' |
| peat | 1' |
| clay, blue | 3' |
| gravel, red | 35' |

This section shows the transition of gravels, clay, silt and peat at contact between the Salmon Springs(?) Drift and the Kitsap Formation.

The Kitsap Formation is well exposed along the base and lower parts of sea cliffs throughout the report area. Well-laminated peat beds form noticeably resistant strata in many exposures and some are observed to crop out from beneath beach gravels as at 22/2E-15R (Fig. 15a). These peat strata are particularly well exposed in the Kitsap Formation along the highway west of Port Orchard at 24/1E-27P (Fig. 15b). Here two or three relatively thick strata are exposed at road level and above, beneath a thick sequence of well-bedded blue clays and silts.

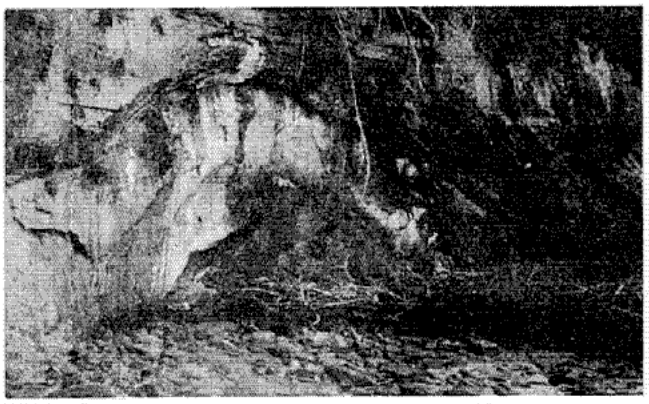


a. Peat stratum exposed in beach gravels south of Sandford Point on Vashon Island at 22/2E-15R.

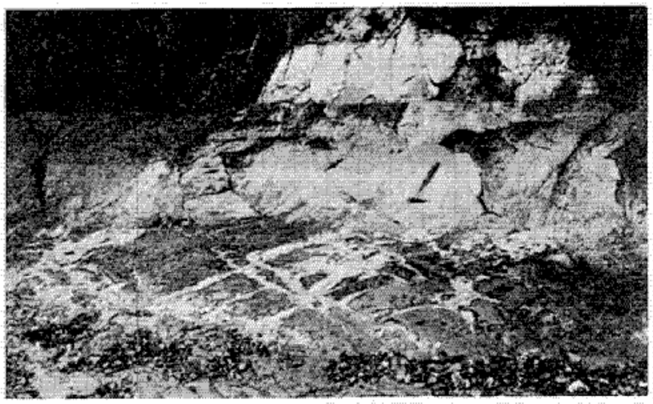


b. Peat strata within silts and clays, exposed along highway west of Port Orchard, at 24/1E-27P.

Figure 15. KITSAP FORMATION

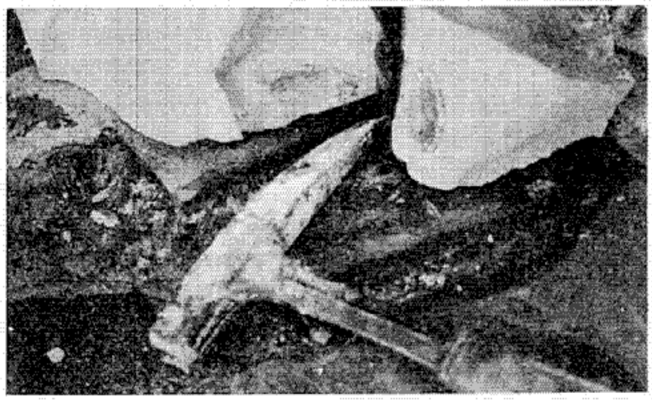


a. Massive 20-foot silt bed, showing spalled off blocks lying on beach.



b. Base of silt bed, showing wave-eroded character of hard materials, also joint pattern of mudcracks exposed at beach level.

Figure 16. KITSAP(?) FORMATION
Exposure of massive, nearly shale-hard stratum of silt at base of beach bluff on Vashon Island at 22/2E-2Q. Although mapped as Kitsap Formation, this material may be of considerably greater age.



c. Fragment of silt, showing fossel clam replaced by vivianite.

The Kitsap Formation is normally well-stratified and in most places the clay strata are finely laminated in contrast to the thicker, more massive and predominately contorted clays of the pre-Salmon Springs(?) deposits, undifferentiated. In some localitites, however, differentiation between the older clays and the Kitsap Formation clays is difficult, and only a detailed petrologic-mineralogic study will separate the glacial and nonglacial character of each. In some cases the areas mapped on Plate 1 as the Kitsap Formation may actually represent the older materials. For example, one mile north of Lizabuela on Vashon Island (22/2E-2Q), exposed at beach level is a massively bedded, horizontal stratum of brownish to gray silt and clay. The material is nearly shale-hard and numerous blocky fragments have spalled off the outcrop and lie on beach below (Fig. 16a). In places where the silt and clay surface has been eroded to beach level a joint pattern of mudcracks is observed (Fig. 16b). Of particular interest are the numerous small brilliant blue vivianite inclusions, some of which have replaced fossil fresh-water clam shells (Fig. 16c).

The thickness of the Kitsap Formation varies greatly throughout the report area, from less than a foot to more than 200 feet, with the top of the formation ranging from below sea level to 200 feet or more above sea level. As shown in the diagrammatic sections on Plate 1, the thickness of the Kitsap Formation has probably been exaggerated, owing to inclusion here of older undifferentiated clays and silts. Conversely, in some areas where sands and gravels occur in the lower part of the formation these have been mapped with the Salmon Springs(?) Drift. Likewise, where the upper part of the Kitsap Formation has graded into sand, this has been mapped as Colvos Sand.

Because of the widespread distribution of these peat-bearing nonglacial sediments throughout the Puget lowland, the Kitsap Formation has been considered useful in stratigraphic correlation of nonglacial materials in the report area. However, the time correlation between peat beds of apparent stratigraphic similarity has been occasionally subject to revision owing to both a variation in dates obtained from a given bed and a possible variation in methods of analyses between the several laboratories conducting the tests. For example, recent redating of peat collected at Johnson Point in Thurston County gives an age greater than 42,000 years, whereas an earlier analyses gave a date of 27,900 years (Dorn and others, 1962). Peat beds from an apparently similar stratigraphic horizon in Seattle have been dated as 20,300 years (Stark and Mullineaux, 1950), and even younger dates of 15,000 years have been subsequently obtained in Seattle (Mullineaux and others, 1965). Further north, in the Strait of Georgia lowland, peat and wood collected from the Quadra Formation, believed to be stratigraphically correlative to the Kitsap Formation, have been dated between approximately 25,000 and 35,000 years.

## Unnamed gravel

Associated with the finer floodplain deposits of the Kitsap Formation, and found exposed along the bluffs of the western upland, is a thick sequence of poorly bedded rust-colored gravel and coarse sand. Previously mapped with the Vashon advance outwash by Sceva (1957), these generally coarse sediments consist predominantly of basalt, argillite, sandstone and slate pebbles, derived almost entirely from rocks of the Olympic Mountains. Occasionally a granitic pebble of northern origin is found, undoubtedly a re-worked constituent of an earlier glacial drift. In places the gravel is considerably weathered and decomposed, and disintegrates under the blow of a hammer, while in other outcrops it is well cemented and conglomeratic, and at beach level has been eroded by wave action to form overhanging alcoves. Interbeds of reddish to yellowish silt and clay with some peat strata indicate the gravel's nonglacial character and relationship to the more widespread Kitsap Formation.

Although bedding is generally poorly defined, some exposures visited on the west shore of Hood Canal across from the report area (Fig. 17) show an eastward dipping bedding that suggests the gravel's origin as fluviatile or glaciofluviatile material deposited as alluvial fans extending beyond the foothills of the Olympic Mountains. The reddish gravel has also been found by Noble (oral communication) to be widespread as a major depositional unit throughout the lowland of southern Mason County. Until a more detailed study has been made of this formation, it is in this report designated the unnamed gravel.

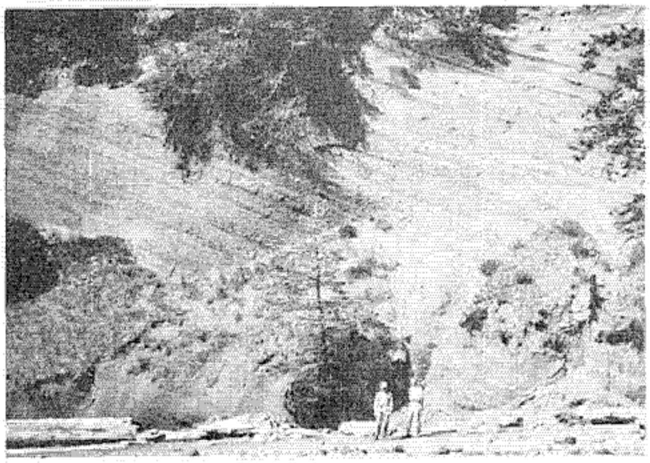


Figure 17. UNNAMED GRAVEL, exposed on west shore of Hood Canal, Mason County. Deltaic bedding dips eastward from front of Olympic Mountains. Vashon till overlies gravel in upper right corner of photograph.

Vashon Drift

The Vashon Drift was named by Willis (1898) and includes the extensive till sheet and associated outwash sands, gravels, and clays deposited in the Puget Sound lowland during the advance and recession of an ice lobe originating in the north during the latest major glacial epoch.

Vashon outwash is material which was deposited beyond the ice front by glacial meltwater streams. Near the ice front, poorly sorted, roughly stratified gravel and coarse sand was deposited while at greater distances from the glacier front finer-grained, more evenly stratified sands, silts and clays were deposited. Material deposited ahead of the advancing glacier and subsequently over-ridden by the ice is termed "advance outwash," while material deposited during the recession of the glacier and consequently laid down across the till surface exposed by the retreating ice is termed "recessional outwash." These two outwash units are usually separated by the intervening stratum of glacial till, normally a mixture of gravel and cobbles in a matrix of clay and silt, laid down as a basal deposit beneath the moving ice sheet.

Included with the Vashon Drift is a younger clay deposited during late Vashon time in glacial Lake Russell (Bretz, 1913).

Because present evidence suggests that the Colvos sand was laid down as a proglacial deposit of the Vashon ice sheet, it is included under the discussion of the Vashon Drift.

Colvos Sand

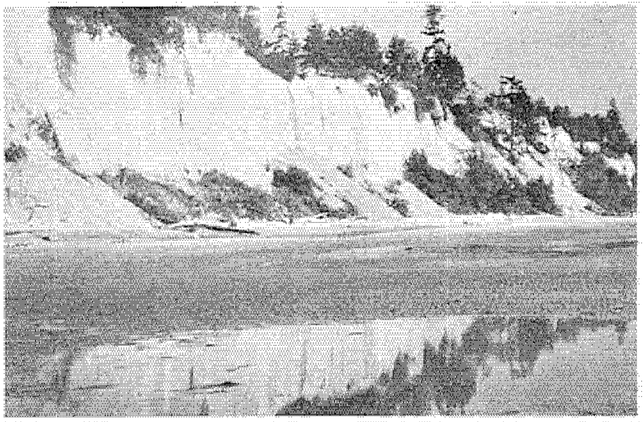
The nonglacial peat-bearing clays and silts of the Kitsap Formation are overlain by a thick sequence of fine-grained, well sorted sands. Deposits range from finely laminated varved clays and silt, usually found at the base of the formation, to thick, massive strata of sand, with local strata and lenses of coarse sand and gravel. Current and deltaic bedding are present in some places. Some exposures exhibit varying gradations from sand to gravel, while others show well-bedded strata and lenses of silt and clay.

As discussed earlier, the sand sequence was believed by Sceva (1957) to be correlative to the Puyallup Sand, a formation first described in the Tacoma area by Willis (1898). Subsequent studies have found this sand to be of much younger age than that of the originally described Puyallup Sand, and also to be of glacial derivation as opposed to the nonglacial origin of the Puyallup Sand.

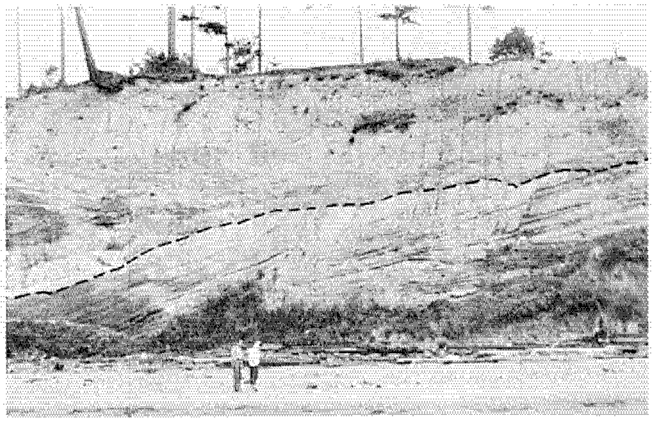
The thick sand sequence is prominently displayed in many sea cliffs throughout the report area (Fig. 18a) and is believed to be correlative to many similar thick sand units exposed along the waterways in other parts of the Puget Sound lowland, such as the upper part of the Lawton Formation described in the Seattle area by Stark and Mullineaux (1950) and the Esperance sand described in Snohomish County by Newcomb (1953). As the sand has been only tentatively correlated to the previously named units found elsewhere, the writer proposes that, because the sand is well exposed in the sea cliffs along Colvos Passage, the name Colvos Sand be applied to this unit.

At many places along both shores of Colvos Passage the Colvos Sand exhibits its gradation from blue glaciolacustrine clays at the base, usually near beach level, upward into silt and sand. At 23/3E-7L-M, near the north end of Vashon Island, a road descending from the upland to Sandy Beach passes through excellent exposures of the entire sequence from Vashon till to the clays at the base of the Colvos Sand and silts of the Kitsap Formation. From near beach level to an altitude of about 250 feet is exposed a thick sequence of well-bedded, soft brown sand. The top of the sand grades upward into coarser strata of sand and gravel of the Vashon advance outwash, above which lies Vashon till. The contact between the Colvos Sand and advance outwash is conformable and gradational, indicating an environment of continuous, uninterrupted deposition at this location.

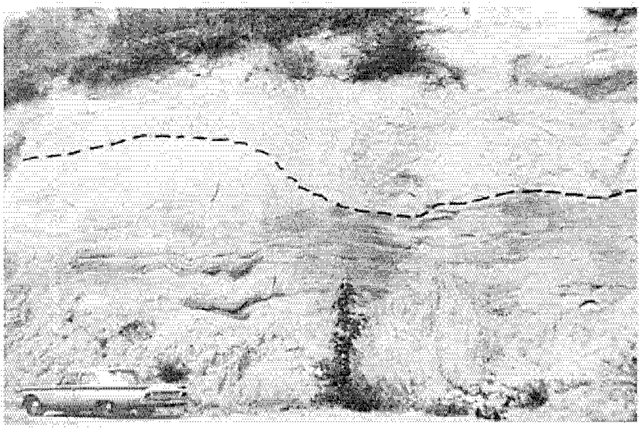
Although in some exposures the Colvos Sand is unconformably overlain by gravels of the Vashon advance outwash (Fig. 18b) and in some places is directly overlain by Vashon till (Figs. 18c, 18d), the erosional interval was evidently of short duration and local in extent in the Kitsap Peninsula. Some exposures display injection of underlying clays and silts into the Colvos Sand. This is well illustrated at 28/2E-18, south of Foulweather Bluff (Figs. 18e, 18f), where strata composed of dark clays and lighter silts have been



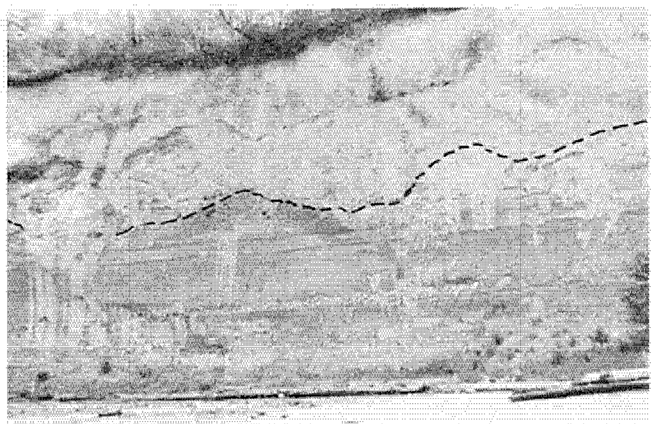
a. Thick exposure of Colvos Sand in sea cliff at 28/2E-19J.



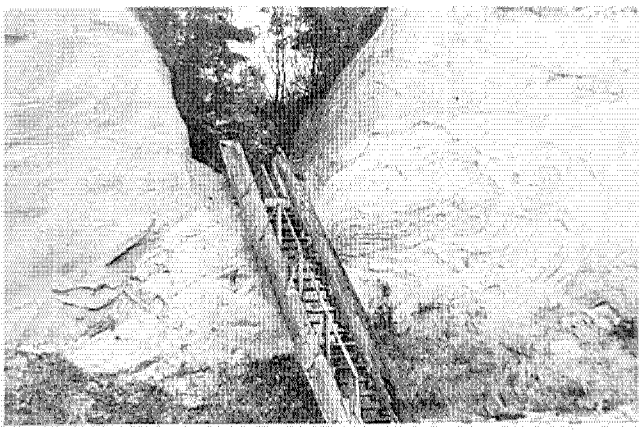
b. Colvos Sand unconformably overlain by Vashon advance outwash and till, exposed in sea cliff at 28/1E-13B.



c. Bluff near Annapolis at 24/1E-25M, showing Colvos Sand overlain by Vashon till.



d. Sea cliff at 28/2E-18D, showing Colvos Sand overlain by Vashon till. Lower part of cliff shows fragments of Kitsap Formation clays aligned in bedding plane.



e. Clay injected upward into Colvos Sand, exposed in sea cliff at 28/2E-18Q.

f. Detailed view of clay injected into horizontally bedded Colvos Sand.

Figure 18. COLVOS SAND. Several exposures showing relationship to overlying and underlying depositional units.

contorted beneath horizontally bedded sand. The clays involved were probably laid down in lakes early in the period of deposition of the Colvos Sand. According to Bretz (1913, p. 185) such distortion of the clay beds without noticeable deformation of overlying beds of sand might be the result of vertical compression and a quicksand-type environment during the deposition of the sand.

The thickness of the Colvos Sand varies throughout the report area from a few feet to over 300 feet, with the base of the unit usually found near sea level.

The Colvos Sand is in some upland areas difficult to distinguish from Vashon recessional outwash sands, and, as mapped on Plate 1, the Colvos Sand may include Vashon recessional outwash materials. Where Vashon till is not present above the Colvos Sand to distinguish it from Vashon recessional outwash sands, the following criteria have been used by the writer to identify the Colvos Sand: (1) greater compaction of the sand, as opposed to the comparatively loose consolidation of the recessional sand; (2) presence of a thin surficial zone of fissile clay at top of sand, indicating the unit was probably affected by the subsequent overriding of the Vashon glacier; and (3) presence of occasional erratics or lag gravels upon the surface of the Colvos Sand. Otherwise the sands have been mapped locally as Vashon recessional outwash sands. Areas in the Kitsap Peninsula where such upland exposures of Colvos Sand and/or Vashon recessional outwash sands are found are the relatively broad upland valleys listed below according to geographic provinces:

- Northern upland: valley heading south end of Port Gamble bay southwest of Striebels Corner; upland north of Indianola.
- Central upland: Barker Creek valley; Claire Marsh-Meadowdale valley; upland east of Tracyton.
- Southern upland: uplands above Port Orchard and Annapolis; Burley Creek-Blackjack Creek valleys; Olalla Creek-Long Lake-Curley Creek valley; Minter Creek valley; Gorst Creek-Union River trough.
- Vashon Island: upland near Point Beal; north half of Burton peninsula.
- Gig Harbor peninsula: McCormack Creek valley; Artondale Creek valley; Raft Island and south along southwest upland of peninsula.
- Longbranch peninsula: upland alongside main north-south road in north half of peninsula; valley heading north from Whitman Cove.

## Advance Outwash

As mapped on Plate 1, the advance outwash consists chiefly of the gravels and coarse sands that lie beneath the Vashon till cap and above the finer sands mapped as Colvos Sand. Many deposits of advance outwash gravels obscure underlying materials by forming a thin veneer along valley sides. These may lead to a misconception as to the character of the materials forming the uplands. In these areas it is often necessary to study drillers' logs to interpret the probable geologic sequence. A typical exposure of Vashon advance outwash beneath a till capping is a sequence of poorly sorted gravels at the top grading downward into better sorted and stratified gravels and sands, with locally a lense or stratum of lacustrine silt or clay (Fig. 19).

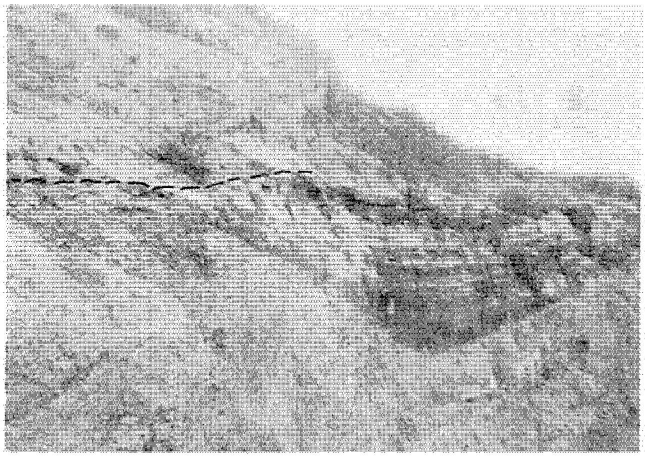


Figure 19. VASHON ADVANCE OUTWASH. Gravel pit exposure at 24/1E-34K south of Port Orchard, showing Vashon till overlying advance outwash gravels and a lense of bedded sand and silt.

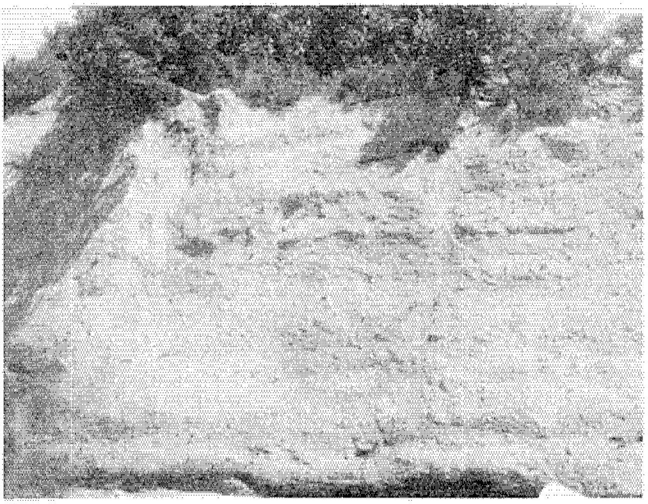
## Till

Till is a primary deposit associated with each glacial advance. Till is normally a gray to bluish-gray compact and unsorted mixture of cobbles and pebbles in a binder of silt and clay. This material was "smeared" along the ground by the tremendous pressure produced by the weight of the ice. This basal deposit of the ice characteristically forms a capping on the topography over which the ice sheet advanced. The normally compact nature of the glacial till has given to it the local name of "hardpan." It is commonly so hard that blasting is required during the construction of dug wells, although in some places where the ice rode over sandy materials, such as the Colvos Sand, the till may be sandy and relatively friable.

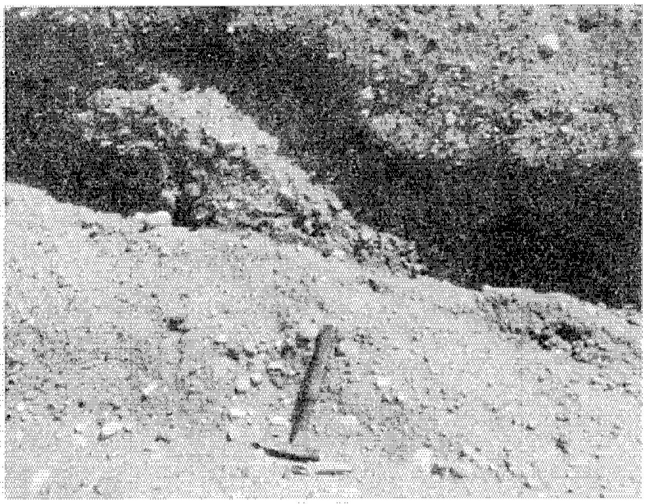
Observed exposures of Vashon till vary in thickness from less than a foot to more than 50 feet. The nature of till deposition beneath moving ice has generally resulted in greater thicknesses being laid down on the southerly or "lee" slopes. This is particularly noticeable in the great thicknesses of till found exposed on many south-facing sea cliffs. In many such exposures the entire cliff is composed of till (Fig. 20). In contrast, most north-facing sea cliffs consist primarily of older materials capped by a thin till sheet.

The weight and pressure of the moving ice on underlying sediments have caused their deformation in some places. At 22/2E-14D on Vashon Island south of Lizabeula a thick sequence of well-bedded Colvos Sand exhibits a gradually steepening dip until it is nearly vertical as it parallels similarly upturned silt and clay strata of the pre-Salmon Springs(?) deposits. This structure is a result of the great force exerted by the overriding Vashon glacier.

Marine fossils were found by Sceva (1957) in the till in the low sea cliff along Skunk Bay at 28/2E-18H southeast of Foulweather Bluff. The writer examined small fragments of marine shells in the same general location and it was apparent that such fragments were derived from older underlying sediments of pre-Vashon age. It should be noted that in the northern part of the Puget Sound lowland, near Bellingham in Whatcom County, marine fossils have been found intact by Easterbrook

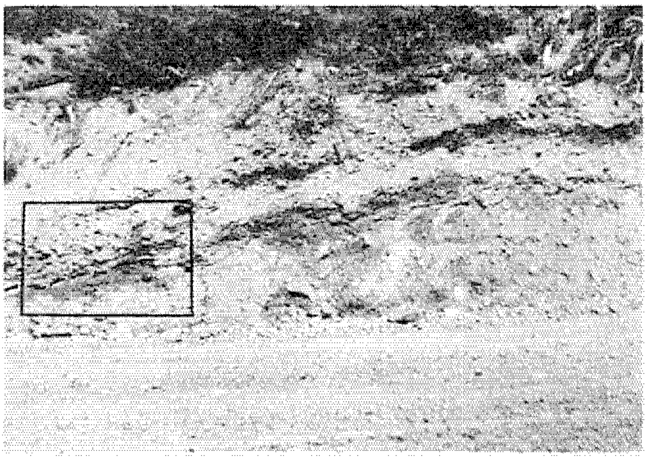


a. Till exposed in 50-foot sea cliff at 21/1E-27G, west of Fox Island Bridge.

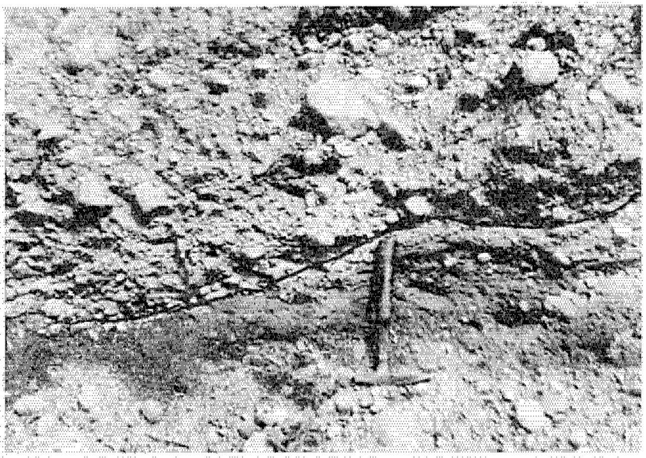


b. Detailed view of till, showing unsorted mixture of coarse pebbles in silt and clay.

Figure 20. VASHON TILL



a. Ablation till overlying till, seen in road cut at 24/2W-32Q.



b. Detailed view of outlined area.

Figure 21. VASHON ABLATION TILL

Figure 22. GLACIAL ERRATIC. Greenstone boulder near outlet to Lake Tahuya at 24/1W-20C.

(personal communication). These occur in two glacio-marine drift units subsequently assigned by Easterbrook to the Bellingham and Kulshan glaciomarine drifts (Armstrong and others, 1965).

Vashon till is composed of a great variety of rock types which indicate their derivation from rocks of the northern Cascades and British Columbia. Locally, in areas south of the Green Mountain-Gold Mountain upland, the till contains basalt fragments derived from the Tertiary volcanics forming those hills. In areas adjacent to outcrops of the Blakeley Formation fragments of those sedimentary rocks are incorporated in the till.

Vashon till is normally unweathered and fresh in appearance in most exposures, with no chemical or mechanical decomposition of individual components, although in places springs and ground-water seepage have given the till a rusty oxidation coating.

Vashon till is overlain in some broad upland areas by a few feet of ablation till—the part of the glacier's rock load deposited as the ice melted. It is less compact than the basal till and many of the finer particles of silt and clay have been washed away by meltwater. Large upland areas, such as the Tahuya peninsula of the western upland and the western part of the southern upland, are overlain by ablation till deposits of loose, unsorted, coarse gravels (Fig. 21), and occasional erratic boulders (Fig. 22).

## Recessional Outwash

Vashon recessional outwash occurs in the report area chiefly as a mantle of sand and gravel lying on the till (Fig. 23). In many places these deposits are not sufficiently thick or extensive to map and have been included with the Vashon till. Thicker deposits occur in several meltwater channels and depressions in the uplands and were separated into two units consisting of recessional gravels(Qvr) and recessional sands (Qvrs), the latter including Sceva's Gorst Creek outwash (1957) and probably including some Colvos Sand.

The Gorst Creek outwash was named by Sceva (1957) to include a deposit of fine-grained, well bedded sand that accumulated in the Union River-Gorst Creek valley during the waning stages of the Vashon glaciation. The sand was evidently deposited under quiet water conditions and covered many large blocks of Vashon ice. Subsequent melting of the glacier fragments resulted in the development of kame and kettle topography, and local slump-deformation of the strata.

As discussed earlier, the recessional outwash sands as they occur in broad upland valleys are difficult to distinguish from the underlying Colvos Sand and, as mapped on Plate 1, the names of the two units may in some places be interchangeable. Likewise, the coarse, poorly bedded recessional outwash gravels are in many places indistinguishable from the ablation till and are mapped with the till on many upland areas.

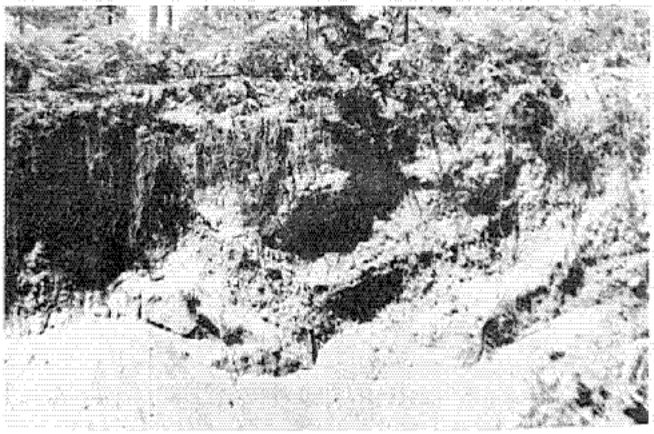
## Younger Clay

Exposed only in a few places in the Kitsap Peninsula area is a well stratified unit of clay which is believed to have been deposited in glacial Lake Russell (Bretz, 1913) at the close of the Vashon glaciation. The 4- to 6-inch beds of buff to blue-gray clay overlie Vashon till and recessional outwash deposits. Although found as high as 100 feet above sea level in small isolated exposures throughout the report area, this younger clay has been mapped on Plate 1 only in the Ora Bay area of Anderson Island and near Hansville in the northern part of the Kitsap Peninsula.

## Recent Alluvium

Sedimentary materials continue to be deposited through the present day. Postglacial depressions and ponds have been the sites for deposition of silt, clay and peat. Streams have deposited sand and silt in valleys and across growing deltas at the heads of numerous Puget Sound embayments.


a. Deltaic bedding in recessional outwash overlying till at 22/2W-18P in bluff along Hood Canal.



b. Recessional gravel strata distorted by slumping, roadcut at 23/2W-7F.

Figure 23. VASHON RECESSIONAL OUTWASH

Table 2. A SUMMARY OF STRATIGRAPHIC UNITS OF PLEISTOCENE AGE IN THE KITSAP PENINSULA.

| Map Symbol | Stratigraphic unit | | Character and extent | Thickness in feet | Water-bearing properties |
|---|---|---|---|---|---|
| Qvr | Vashon Drift | recessional outwash | Discontinuous bodies of unconsolidated silt, sand, and gravel. Deposited by meltwater of Vashon glacier. | 0-100 | May yield small to moderate supplies of ground water for domestic purposes where deposits have considerable thickness. |
| Qvt | Vashon Drift | till | Extensive till sheet which mantles most of upland areas. Till varies greatly in compaction and composition. | 0-80 | Essentially impervious, but may yield small supplies of perched ground water. |
| Qva | Vashon Drift | advance outwash | Discontinuous bodies of unconsolidated silt, sand, and gravel. Deposited by meltwater streams from advancing Vashon glacier. | 0-50 | Yields moderately large to large quantities of water where deposits extend below water table. |
| Qc | | Colvos Sand | Principally stratified sand. Contains irregular lenses of fine gravel, and thin strata of clay and silt. Underlies Vashon Drift throughout most of Peninsula. | 0-300 | Primary formation presently utilized by drilled wells where base below water table. Sand yields domestic quantities; gravel strata yield moderately large quantities. |
| Qg | unnamed gravel | | Poorly bedded, pebble to cobble gravels. Primarily rust-stained, some decomposed, some cemented. Includes silt and peat beds. | 0-400+ | Domestic supplies obtained from unconsolidated gravels near sea level in Tahuya area of Hood Canal. |
| Qk | Kitsap Formation | | Principally well-bedded silt and clay, with occasional lenses of sand and gravel. In places contains peat beds. | 0-200+ | Gravel lenses yield small quantities of water, but formation normally of low permeability and yields little or no ground water. |
| Qss | Salmon Springs(?) Drift | | Principally stratified sand and gravel. May be stained buff or orange-colored in outcrop. Contains some silt, clay and till strata. | 0-300+ | Yields large quantities of ground water, frequently under artesian pressure. |
| Qpu | pre-Salmon Springs(?) deposits, undifferentiated | | Principally massive blue clay and silt. Deformed in most places. Contains till, volcanic ash, peat or lignite, sand, and some gravel strata. Top of formation usually below sea level. | 0-600+ | Clay, silt and till strata yield little or no ground water. Gravel may yield small to moderate quantities. Successful wells are few. |

## GROUND WATER

The general features of ground-water occurrence, including a definition of ground water and a discussion of the water table, unconfined and confined ground water, ground-water recharge and discharge, hydraulics of a well, and salt-water contamination are given on Plate 2.

## OCCURRENCE OF GROUND WATER WITHIN STRATIGRAPHIC UNITS

### TERTIARY ROCKS

#### Volcanic Rocks

Owing to their dense and extremely impermeable character the volcanic rocks are not important as aquifers and no wells in the report area are known to develop adequate supplies of ground water from these rocks.

### Sedimentary Rocks

Many deep wells have been drilled into the sandstone, shale and conglomerate of the Tertiary Blakeley Formation, but most of these have been unsatisfactory as to yield and quality of water obtained. Two wells drilled by the U.S. Navy at the south end of Bainbridge Island penetrate this formation. Well 24/2E-10R, 1700 feet deep, reportedly yielded only small quantities of saline water. Well 25/2E-36N, 1403 feet deep, yielded less than 15 gallons per minute with several hundred feet of drawdown, and the water was of poor quality. Wells drilled near the Watauga Beach community at Point Glover have experienced similar results. Well 24/2E-9G, 400 feet deep, had a drawdown of more than 200 feet in 12 hours of pumping only $2\frac{1}{2}$ gallons per minute, and the water was also undesirably high in mineral content. Well 24/2E-9L, 184 feet deep, flowed several gallons a minute but the water was brackish and not usable. Several other wells in this area produced barely minimum domestic supplies, although well 24/2E-9M, 200 feet deep and entirely in the Blakeley Formation, produced sufficient water to supply several families.

## QUATERNARY ROCKS

### Pre-Salmon Springs(?) Deposits, Undifferentiated

These sediments are not normally to be considered an important source of ground water in the Kitsap Peninsula because of their generally low permeability. A few wells drilled into the coarser sediments at depth have produced moderate to large quantities of water; however, the casings of several of the deep wells are perforated in so many horizons that it is uncertain whether water is being obtained from these older materials or from overlying aquifers. Owing to the difficulty in distinguishing from well logs between the Salmon Springs(?) Drift materials and the older deposits of sand and gravel, it is not certain which of the two formations might be producing the main water supply.

Deep sand and gravel strata interbedded with clay and silt are the chief aquifers in these older materials; some are reported to occur as much as 1000 or more feet below sea level. Wells developing water from these aquifers generally have low specific capacities and in many cases sand flowing into the wells is a problem. However, in a few cases wells penetrating the upper finer materials which serve as confining layers have obtained water under artesian flow conditions from the deeper coarser gravel materials. Such flowing wells have been drilled near Burley at 22/1E-1N, 11A, and 12D, two of which flowed several hundred gallons per minute when drilled. Flowing wells were also drilled near Keyport at 26/1E-36N, and along the shores of Sinclair Inlet in the Bremerton-Port Orchard-Annapolis area (wells 24/1E-23B with a flow of 20 gallons a minute, 24/1E-25E with a pumping capacity of 1700 gallons a minute, and 24/1E-33L with a pumping capacity of 3000 gallons a minute). Several wells that were perforated in only the deeper horizons (wells 24/1E-25K and 36F) yielded several hundred gallons a minute at the time of drilling but the yields soon diminished to the extent that the wells were no longer usable.

The construction of deep wells in the pre-Salmon Springs(?) deposits, undifferentiated, entails considerable risk of failure as the formation is principally fine-grained, the permeable strata are not continuous and sustained production can be developed only in aquifers that have free access to overlying formations. It is advisable to thoroughly test for yield all overlying permeable materials before attempting to drill deeper into the older sediments.

### Salmon Springs(?) Drift

Because the coarse gravels of the Salmon Springs(?) Drift lie at or slightly above sea level and below the regional water table in most of the Kitsap Peninsula, it is probably the most important potential source of ground-water supplies for future development in the report area. Lying below the fine-grained Kitsap Formation, it is also capable of yielding large quantities of artesian ground water.

Among the wells which show capability of yielding large supplies of ground water from the Salmon Springs(?) Drift are those listed below:

- 21/2E-8C: Town of Gig Harbor; 340 gpm from 200 feet below sea level.
- 22/1E-12N: E. Black, near Burley; 600 gpm artesian flow from 200 feet below sea level.
- 24/1E-5E: Erland Point Water Company; 500 gpm from 30-150 feet below sea level; initially had artesian flow.
- 24/2E-7D: North Perry Water District; 800 gpm from 50-60 feet below sea level.
- 26/1E-32M: U.S. Navy Ammunition Depot; 550 gpm from 75-300 feet below sea level.
- 27/2E-7A: Town of Port Gamble; 150 gpm from 100 feet below sea level.

As noted under the discussion of the pre-Salmon Springs(?) deposits, undifferentiated, some of the above listed wells may also be obtaining water from these older materials, or from both formations.

### Kitsap Formation

The characteristically fine-grained sediments that compose most of the Kitsap Formation make the sequence unimportant as an aquifer. However, the impermeability of the formation makes it important as an aquiclude, both as a base for perched, unconfined ground water and as a confining layer above the Salmon Springs(?) Drift gravels. The relatively thin and discontinuous sand and gravel lenses in the formation will yield small supplies of ground water, but the clay and silt strata yield little or no water.

In inland areas the Kitsap Formation's relationship with underlying materials must be inferred only from drillers' logs, and it is usually impossible to differentiate between the sands and gravels of the Kitsap Formation and similar materials in either the Salmon Springs(?) Drift or the pre-Salmon Springs(?) deposits. Likewise, where the finer materials of the Kitsap Formation directly overlie the finer materials of the pre-Salmon Springs(?) deposits, it is difficult to separate the two formations. Where these fine materials grade together to form a thick sequence, wells may be drilled to considerable depth without successfully penetrating any coarse water-bearing sands and gravels. For that reason some risk is involved in drilling through the Kitsap Formation in search of the underlying Salmon Springs(?) Drift aquifers. Generally, if the Salmon Springs(?) Drift is present, it is usually encountered within 70 to 150 feet below the top of the Kitsap Formation.

Unnamed Gravel

The unnamed gravel is the primary aquifer underlying the beachfront properties along Hood Canal in the Tahuya area. Here the gravel has yielded domestic supplies to wells drilled to depths of 30 to 40 feet, with the water levels standing slightly above sea level. Salt-water contamination in this area could pose a problem if wells were pumped at excessive rates. The rust-stained appearance of the gravel in many exposures suggests that ground water derived from the formation may contain undesirable amounts of iron.

Vashon Drift

Colvos Sand

The Colvos Sand is the most widely developed source of ground water for domestic supplies in the report area, with the coarser sands and gravels forming the chief aquifers. The regional water table lies above the base of the formation in most places and most wells obtain water under unconfined water-table conditions. Locally, interbedded clay and silt, and overlying till serve as confining and perching strata to small bodies of ground water.

The typical domestic well obtaining water from the Colvos Sand has a 6-inch open-bottom casing, is drilled to a depth of 100 to 150 feet, and will produce 15 to 20 gallons a minute. Proper screening and development of such wells may result in production of 50 or more gallons a minute. Among wells that show capability of yielding moderate to large supplies of ground water from the Colvos Sand are the following:

- 21/2E-21C: Westbridge Estates Water Company; 300 gpm from 255-foot well.
- 22/1W-11J: Union Oil Company; 200 gpm from 352-foot well.
- 23/1W-11J: Kitsap County Airport; 200 gpm from 150-foot well; abandoned after spring supply located nearby.
- 23/2W-13H: State Department of Institutions; 250 gpm from 180-foot well; drilled to 210 feet but pulled back and filled to 180 feet.
- 23/1E-7D: Sunnyslope Water Assn.; 200 gpm from 220-foot well.
- 23/1E-14A: C. Sowa; 100 gpm from 145-foot well.

Advance Outwash

Vashon advance outwash deposits are highly permeable but usually occur above the regional water table. Where these materials occur in considerable thickness and extend below the water table moderately large supplies of ground water may be obtained. Where till overlies these saturated materials, confined ground water may also be obtained. In the till-mantled Clear Creek valley north of Silverdale several wells tap confined ground water zones in the advance outwash sands and gravels.

Till

Because of its compact, dense, and highly impermeable character, till cannot be considered as a water-bearing unit except where more permeable sand and gravel lenses occur within it. Wells tapping such limited aquifers are usually large diameter dug wells, useful only for small domestic supplies, and frequently such wells go dry during the late summer months.

The primary value of the glacial till is in its serving as an impermeable base for perched ground water bodies and as an impermeable cap for confined ground water. Where the till "drapes" or caps a sloping upland surface it also reduces the loss of ground water to springs.

Recessional Outwash

Where the recessional outwash deposits occur in considerable thickness and areal extent in upland valleys, small to moderate supplies of ground water may be obtained. In places where the coarser sands and gravels extend below the regional water table, they are capable of yielding moderate to large supplies. The fine-grained character of some deposits prevent them from being highly productive; these sandy deposits are found in the valleys of Union River, Gorst Creek, Olalla Creek, Long Lake, Curley Creek, Burley Creek, Blackjack Creek, and Minter Creek. Small domestic supplies are obtained from large diameter wells dug into the saturated portions of these sands.

The recessional outwash also occurs in local depressions on the undulating surface of the Vashon till, and perched ground water accumulates and is available from shallow dug wells. Because such perched aquifers are limited in extent and storage capacity, the water levels normally exhibit a marked seasonal fluctuation, and many such aquifers become depleted during the late summer months.

Younger Clay

As the younger clay is usually found above the water table and is highly impermeable, it is of no importance as an aquifer in the report area. Moreover, because it mantles the surface in a few low bank shoreline areas, the clay tends to impede the downward percolation of precipitation to the underlying aquifers.

Recent Alluvium

Except where the water table intersects these materials near ground surface adjacent to streams and lakes, Recent alluvial deposits are of little importance as aquifers. However, depending upon local characteristics of permeability, alluvium influences the rate of downward percolation of precipitation to the local water table.

## AREAL OCCURRENCE OF GROUND WATER

GENERAL

Plate 2 shows the location of wells on the Kitsap Peninsula and certain adjacent islands on which information on well yields and water levels has been obtained from drillers' logs and well canvasses of the area. The well locations are designated by symbols identifying them as dug or drilled, and signifying whether or not a well log is available. The numerals beside each well describe either (1) the altitude of the water level above mean sea level and the pumping capacity in gallons per minute, or (2) the land surface altitude above mean sea level of flowing wells and the flow in gallons per minute.

Appendix A tabulates information only on wells used as a basis for the development of the diagrammatic cross sections shown on Plate 1. Information on all other wells may be obtained from the State Division of Water Resources.

As noted on Plate 2 there are large areas for which well information is not available. It may be presumed that these areas are either (1) largely unpopulated, (2) served by shallow dug wells which supply only the minimum domestic needs, (3) supplied by surface springs or streams, or (4) served by large community water systems.

The development of an extensive regional water table beneath the Kitsap Peninsula is precluded by the high degree of dissection of the land. The ground-water table beneath each peninsula and island has as its base level the surrounding marine waters. Along the shorelines of the peninsula the water table is near sea level while farther inland it rises and roughly parallels the topography of the upland areas, rising beneath hills and dropping near lakes and stream valleys. Locally, perched ground-water bodies will be found at higher altitudes where the till capping has created a relatively impermeable base underlying pockets of recessional sands and gravels. Such aquifers are usually tapped by shallow dug wells and supply the minimum domestic requirements of many of the small farmsteads which occupy the uplands.

The following discussion describes the general areal distribution and availability of ground-water supplies in the various provinces of the report area. Tables 3 through 9 list those wells within the separate provinces that have been tested by drillers to be capable of producing moderate to large supplies of ground water. Besides listing the general area, well number (see Fig. 9), and name of owner or tenant, the tabulation presents the following information:

- Altitude: altitude of ground surface at well, in feet above mean sea level.
- Depth and Diam.: depth of well in feet, and diameter in inches.
- SWL: static water level in well before pumping, measured in feet below land surface.
- Dd: drawdown in feet of water level during pumping.
- Yield (gpm): gallons per minute yield of pump.
- Capacity (gpm): estimated potential yield in gallons per minute when 2/3 of available drawdown is utilized.

## NORTHERN UPLAND

Small to moderate supplies of ground water are obtained from sand and gravel aquifers in the northern upland. As precipitation decreases toward the northern part of the Kitsap Peninsula (Plate 4), annual recharge to the aquifers also decreases.

Most of the wells in the vicinity of Foulweather Bluff, at the extreme northern end of the report area, obtain water from sand and gravel aquifers which are usually penetrated at altitudes close to sea level. A 1206-foot gas test well was drilled at 28/2E-17M and penetrated mostly sand and clay except for a gravelly zone from 740 to 772 feet. Many of the sand zones above this gravel zone were water-bearing.

Water from most of the wells in this area is high in dissolved mineral matter, and some has an unpleasant taste.

In general, the deep wells located on upland areas must first penetrate the till and underlying deposits before reaching the Salmon Springs(?) Drift sand and gravel aquifers at or near sea level. Otherwise shallow dug wells may supply small quantities from local bodies of ground water perched on the till.

In the Kingston area ground-water withdrawals are chiefly from shallow domestic wells dug into the till or underlying materials. Deeper wells indicate the area to be underlain primarily by sand and silt. Well 27/2E-25N at the Kingston Ferry dock was drilled to a depth of 298 feet in fine-grained sediments and obtained water from a 6-foot sand stratum between 266 and 272 feet. Finished with a 0.010-inch slot screen, the well tested at about 50 gallons per minute which shows the capability of an efficiently constructed well in this area.

The water table is usually shallow beneath the lowland areas in and adjacent to Kingston, but lies more than 100 feet beneath some of the adjacent uplands. Several wells per farm may be required to obtain ground water in quantities suitable for irrigation in this area.

Other than from shallow dug wells, most of the domestic supplies in the northern upland are obtained from the several streams and spring zones located in the major upland valleys.

## CENTRAL UPLAND

Records of wells on much of the central upland indicate that the materials underlying the till are generally fine grained, with sand strata forming the principal aquifers. Adequate screening or perforation and efficient well construction are required for development of irrigation or other large supplies from aquifers beneath this upland.

Tertiary sedimentary rocks of the Blakeley Formation are exposed above sea level south of Tracyton, and this belt of impermeable rocks extends beneath the southern end of the central upland. For this reason large supplies of ground water cannot be found at great depth in this area.

## BAINBRIDGE ISLAND

Except for Tertiary bedrock underlying the southern part of the Fort Ward peninsula, Bainbridge Island is underlain by Pleistocene sands and silts with minor amounts of gravels. In most places on the upland these deposits are overlain by a thick mantle of Vashon till. Most of the individual domestic supplies on the island are obtained from shallow dug wells tapping perched ground water above the till. Deeper drilled wells are generally finished with open-bottom or perforated casings, obtaining water from coarser sand and gravel strata of the Colvos Sand. In general, the more permeable aquifers are found at depths of less than 200 feet below sea level. Several wells have yielded moderate to large supplies at greater depths, but the available stratigraphic data indicate that considerable risk is involved in attempting such development. The water level is shallow in most wells, seldom exceeding 100 feet below land surface.

Most wells drilled in the Eagledale district at 25/2E-35 obtain water from sand strata of the Colvos Sand near sea level. These materials yield supplies sufficient for domestic requirements, although it is not known whether or not they are capable of yielding adequate water for irrigation purposes. Depths to water locally exceed 100 feet.

Table 3. WELLS ON THE NORTHERN UPLAND CAPABLE OF PRODUCING MODERATE TO LARGE SUPPLIES OF GROUND WATER.

| General area | Well Number | Owner/Tenant | Altitude | Depth and Diam. | SWL | Dd | Yield (gpm) | Capacity (gpm) |
|---|---|---|---|---|---|---|---|---|
| Hansville | 28/2E-16J | R. Randell | 10 | 132 x 6 | 3 | 9 | 40 | 250+ |
| | 22B | U.S.C.G. | 80 | 109 x 6 | 76 | ---- | 50 | ---- |
| | 32G | Cliffside Development Company | 100 | 120 x 6 | 92 | 10 | 50 | 50 |
| Port Gamble | 27/2E-7A | Pope & Talbott, Inc. | 40 | 169 x 10 | 56 | 66 | 100 | 120 |
| Lofall | 27/1E-14P | Jensen, Richards, & Olhava, Inc. | 50 | 126 x 16 | 35 | 42 | 60 | 80 |
| Kingston | 27/2E-25D1 | Kingston Water Users Corp. | 260 | 60 x 24 | 0 | 17 | 65 | 150 |
| | 25D2 | U.S. Corps of Engineers | 260 | 295 x 6 | 230 | 24 | 20 | 40 |
| | 25N | State of Washington (ferry dock) | 5 | 298 x 8 | ---- | ---- | 50 | ---- |
| Indianola | 26/2E-10R1 | (b) (6) [redacted] | 120 | 70 x 8 | 0 | 35 | 35 | 50 |
| | 10R2 | | 120 | 260 x 8 | 90 | 120 | 24 | 24 |
| Suquamish | 26/2E-16P | Suquamish Improvement Co. | 120 | 150 x 8 | 10 | 15 | 25 | 200 |
| Poulsbo | 26/1E-13C | (b) (6) [redacted] | 360 | 248 x 6 | 119 | 5 | 22 | 300+ |
| | 14G | | 60 | 120 x 6 | + | ---- | 60 | (Flowed 60) |
| | 26/2E-18D | | 365 | 284 x 6 | 115 | 35 | 125 | 400 |
| | 30M | | 200 | 208 x 8 | 174 | 15 | 250 | 350 |

Wells in the Winslow area at 25/2E-26 & 27 obtain water from sand and gravel strata generally encountered at depths of less than 200 feet; many of these aquifers are capable of yielding small irrigation supplies.

Several wells on the upland in the Seabold area at 26/2E-33 have failed to obtain adequate supplies for even domestic requirements owing to the fineness of the materials encountered. However, since most of the unsuccessful wells bottomed at altitudes above sea level, the character and water-bearing properties of the materials lying below sea level are not known. Many wells located at low altitudes around the margin of the upland have obtained satisfactory supplies from sand and gravel strata within the first 100 feet below sea level; if these aquifers extend below the upland, they could be tapped by deeper wells on the upland.

Tertiary rocks of the Blakeley Formation underlie the southern end of Bainbridge Island. These relatively impermeable, well consolidated sedimentary rocks are found exposed in the south half of the Fort Ward peninsula and along the lower slopes overlooking Blakely Harbor. Wells dug or drilled in these areas obtain only meager supplies of ground water for domestic use, in most cases the water being obtained from overlying Pleistocene sands and gravels filling depressions in the bedrock surface. In the northern part of the Fort Ward peninsula, two or three wells have penetrated sufficient thickness of sand and gravel strata to provide moderate supplies of ground water.

## WESTERN UPLAND

Generally, ground-water development on the western upland has been for domestic supplies, most of the wells being shallow dug wells that obtain perched ground water from the till or overlying outwash materials. The deeper drilled wells penetrate the till and obtain water from the underlying Colvos Sand or older formations. Several large-capacity wells have been drilled at the U.S. Naval Station at Bangor, and at the U.S. Navy base at Bremerton.

The Camp Union area is a small, sparsely populated district in the central part of the western upland at 24/1W-5, 6 and 7. The land surface is mantled by 30 to 40 feet of till, with most drilled wells passing through the till to obtain water from the underlying Colvos Sand within 150 feet of land surface. Although these wells now yield only domestic supplies, they are probably capable of yielding larger supplies with proper development.

Table 4. WELLS ON THE CENTRAL UPLAND CAPABLE OF PRODUCING MODERATE TO LARGE SUPPLIES OF GROUND WATER.

| General area | Well Number | Owner/Tenant | Altitude | Depth and Diam. | SWL | Dd | Yield (gpm) | Capacity (gpm) |
|---|---|---|---|---|---|---|---|---|
| Scandia | 26/1E-27J | (b) (6) [redacted] | 40 | 86 x 6 | 0 | 5 | 30 | 350 |
| Keyport | 26/1E-36M | U.S. Navy | 20 | 1036 x 12-22 | + | 50 | 1750 | 1750+ |
| Silverdale-Dyes Inlet | 25/1E-16J | (b) (6) [redacted] | 200 | 206 x 8 | 99 | 7 | 25 | 250 |
| | 21B | | 50 | 70 x 6 | 27 | 6 | 22 | 100 |
| | 28R | | 80 | 92 x 6 | 23 | 7 | 25 | 150 |
| Gilbertson | 25/1E-24H | | 15 | 274 x 8 | + | 20 | 250 | 1500+ |
| Meadowdale | 25/1E-25M | | 230 | 143 x 6 | 70 | 5 | 50 | 450 |
| E. Bremerton | 24/1E-1R | N. Perry Ave. Water Company | 330 | 419 x 12 | 110 | 81 | 750 | 750+ |
| | 24/2E-7D | N. Perry Ave. Water Company | 320 | 480 x 8 | 98 | 112 | 412 | 800 |

Table 5. WELLS CAPABLE OF PRODUCING MODERATE TO LARGE SUPPLIES OF GROUND WATER ON BAINBRIDGE ISLAND.

| General area | Well Number | Owner/Tenant | Altitude | Depth and Diam. | SWL | Dd | Yield (gpm) | Capacity (gpm) |
|---|---|---|---|---|---|---|---|---|
| Manzanita Bay | 25/2E-17C | U.S. Navy | 155 | 910 x 6 | 100 | 45 | 30 | 300 |
| Winslow | 25/2E-26H | (b) (6) [redacted] | 125 | 168 x ? | ---- | ---- | "100 families" | |
| | 26N | Federal Housing Authority | 20 | 163 x 12 | 0 | 100 | 40 | 40 |
| | 26P | Commercial Ship Repair | 10 | 761 x 8-4½ | + | ---- | 300 | ---- |
| Fort Ward | 24/2E-10B | (b) (6) [redacted] | 180 | 98 x 12-8 | 35 | ---- | 60 | 60 |

In the Holly area on Hood Canal, data obtained from two deep wells indicate that the area is underlain mostly by fine-grained materials. Well 24/2W-17R in the Anderson Creek valley was drilled to a depth of 394 feet, and only a small supply was obtained from the fine-grained sediments that occurred at 28 feet and below. Well 24/2W-19A, 184 feet deep, also penetrated only fine sediments which were not very productive. In this area it appears that wells are drilled at considerable risk of failure. Since numerous springs issue along the upper surface of the clays which crop out along the valley slopes and the slope to Hood Canal, it would appear that such sources of surface-water supply would be the most reliable.

Little information is available on ground-water conditions in the shoreline area of Hood Canal between Holly and Musqueti Point (22/3W-18N). A few isolated homes and summer cabins are located near beach level or on bluffs overlooking this largely undeveloped part of the western upland. Water supplies here have been dependent upon local springs and small intermittent streams that drain the upland above. The unnamed gravels that form these bluffs are generally coarse and porous and, with few observable till or clay strata to impede downward percolation of precipitation falling upon the upland, it appears that these materials are essentially barren of ground water until saturation of the gravels is attained near sea level.

Table 6. WELLS CAPABLE OF PRODUCING MODERATE TO LARGE SUPPLIES OF GROUND WATER ON THE WESTERN UPLAND.

| General area | Well Number | Owner/Tenant | Altitude | Depth and Diam. | SWL | Dd | Yield (gpm) | Capacity (gpm) |
|---|---|---|---|---|---|---|---|---|
| Lofall | 27/1E-33N1 | (b) (6) [redacted] | 120 | 200 x 6 | 142(?) | 17 | 25 | 50 |
| | 33N2 | | 120 | 260 x 6 | 132(?) | 15 | 13 | 100 |
| Bangor | 25/1E-6D | U.S. Navy | 320 | 207 x 8 | 127 | 15 | 35 | 100 |
| | 26/1E-32K | U.S. Navy | 295 | 690 x 18-8 | 228 | 82 | 350 | 1500 |
| | 32L | U.S. Navy | 295 | 165 x 8 | 129 | 2 | 30 | 300 |
| | 32M | U.S. Navy | 300 | 700 x 10 | ---- | ---- | 550 (reported yield) | |
| Seabeck | 25/1W-20D | (b) (6) [redacted] | 95 | 190 x 6 | 90 | 10 | 30 | 150 |
| Scandia | 26/1E-27J | | 5 | 86 x 6 | 0 | 5 | 30 | 350 |
| Chico | 24/1E-5E | Erland Point Water Company | 120 | 251 x 12 | + | 42 | 500 | 500 |
| Kitsap Lake | 24/1E-17B | Harlow & Burke | 170 | 363 x 6 | 90 | 20 | 50 | 450 |
| Bremerton | 24/1E-23E | U.S. Navy | 30 | 2000 x 26-12 | ---- | 50 | 1500 | ---- |
| Union River | 23/1W-3N | (b) (6) [redacted] | 160 | 94 x 6 | 52 | 10 | 24 | 75 |
| Hood Canal, east arm | 22/2W-1C | (b) (6) [redacted] | 10 | 42 x 6 | 10 | 12 | 100 | 100 |
| | 9K | Clifton Beach Coop. Water Assn. | 10 | 71 x 6 | 27 | 18 | 1800(?) | 1800+(?) |
| Upland, above Hood Canal | 23/2W-13H | State Dept. of Institutions | 400 | 180 x 6 | 141 | 15 | 125 | 250 |

From Musqueti Point to Tahuya and beyond, along the east arm of Hood Canal, extensive development of waterfront property has increased the demand for ground water. Ground water is being obtained from 30-to 40-foot wells drilled into the unnamed gravels and Vashon Drift sands and gravels. Water levels in these shoreline wells stand slightly above sea level and it must be expected that excessive withdrawal from such shallow wells may result in saline contamination.

In the Seabeck-Warrenville area on Hood Canal, ground water has been obtained mostly from small diameter drilled wells which penetrate the till and tap aquifers in the underlying Vashon advance gravels and Colvos Sand. Some wells obtain artesian flow where the till has served as a confining layer above the underlying sands and gravels. Well 25/1W-14F near Warrenville penetrated 208 feet of clay and silt and was eventually abandoned.

The Scandia area, a small farming and residential community located along Liberty Bay in the northern part of the western upland, is mantled by till up to 60 feet thick. Ground-water supplies are obtained mostly from shallow dug wells, although a few deeper drilled wells have produced domestic supplies. Wells 26/1E-27J and 34C penetrate as much as 138 feet of clay beneath till before the deeper gravel aquifers are reached.

SOUTHERN UPLAND

Present ground-water development in the southern upland is primarily for domestic purposes. The water table is within 100 feet of land surface in most places except the uplands adjacent to Puget Sound or deep valleys where the water level is lowered by spring seepage along the slopes. Along the shorelines of Puget Sound the water table lies slightly above sea level; similarly along the drainage courses the water table usually stands slightly above the level of the streams or lakes. The aquifers are chiefly in Pleistocene sands and gravels, except at Point Glover, where small yields have been obtained from Tertiary sedimentary rocks.

Several large-producing municipal supply wells have been drilled along the south shoreline of Sinclair Inlet in the Port Orchard-Annapolis area. Most of the wells penetrate sand and gravel materials underlying the Kitsap Formation clays and most tap confined aquifers in both the underlying Salmon Springs(?) Drift and pre-Salmon Springs(?) deposits, undifferentiated. Several wells here have artesian flows of over 100 gallons a minute, with well 24/1E-25E (City of Annapolis) having a flow of 750 gallons a minute recorded in 1949 and well 24/1E-25M (City of Port Orchard) reportedly having a flow of 400 gallons a minute. On the upland south

Table 7. WELLS CAPABLE OF PRODUCING MODERATE TO LARGE SUPPLIES OF GROUND WATER ON THE SOUTHERN UPLAND.

| General area | Well Number | Owner/Tenant | Altitude | Depth and Diam. | SWL | Dd | Yield (gpm) | Capacity (gpm) |
|---|---|---|---|---|---|---|---|---|
| Port Orchard-Annapolis | 24/1E-25E1 | Annapolis Water Dist. | 35 | 1133 x 10 | +3 | 55 | 1700 | 1700+ |
| | 25E2 | Silver Springs Brewing Co. | 10 | 314 x 6 | + | ---- | 130 Flow | ---- |
| | 25G | Federal Housing Authority | 120 | 1005 x 24 | ---- | ---- | 350 | ---- |
| | 26K | Town of Port Orchard | 100 | 792 x 10-5 | 35 | 42 | 620 | 2000+ |
| | 33K | City of Bremerton | (several wells here, averaging about 50 feet elevation, depths of 245 to 587 feet, all flowing, with well capacities of 800 to over 2000 gpm. | | | | | |
| | 33L | City of Bremerton | 25 | 622 x 16 | + | 68 | 1080 | 2000+ |
| | 24/2E-31A | Annapolis Water Dist. | 350 | 1006 x 22-16 | 223 | 91 | 325 | 1500+ |
| Point Glover | 24/2E-16K | U.S. Navy | 25 | 136 x 18 | 5 | 33 | 400 | 1000 |
| | 16L | Watauga Beach Community Water Co. | 60 | 141 x 8 | 47 | 25 | 205 | 600 |
| Manchester-Yukon Harbor | 24/2E-15P | U.S. Navy | 63 | 353 x 8 | 53 | 57 | 200 | 600 |
| | 15N | U.S. Navy | 92 | 305 x 12 | 79 | 52 | 60 | 200 |
| | 22M | Manchester Water District | 15 | 116 x ? | 11 | 15 | 150 | 1000 |
| | 27M | (b) (6) [redacted] | 40 | 100 x 6 | + | 25 | 48 | 150 |
| | 33H | [redacted] | 20 | 134 x ? | + | ---- | 400 Flow | ---- |
| | 33J | Manchester Water District | 20 | 185 x 12-8-6 | + | 43 | 420 | 1500 |
| Bethel | 23/1E-1G | (b) (6) [redacted] | 330 | 34 x 36 | 22 | ½ | 5 | 200 |
| | 14A | [redacted] | 280 | 145 x 6 | 93 | 7 | 22 | 100 |
| | 21J | [redacted] | 390 | 101 x 6 | 6 | 0 | 40 | 100 |
| | 17Q | Presbytery of Seattle | 440 | 83 x 6 | 57 | 5 | 20 | 100 |
| Sunnyslope | 23/1E-7D | Sunnyslope Water Dist. | 220 | 220 x 8 | 142 | 28 | 110 | 200 |
| | 23/2E-7G | (b) (6) [redacted] | 160 | 132 x 8 | 91 | "0" | 22 | 100+ |
| | 23/1W-11J | Kitsap County Airport | 430 | 150 x 48 | 115 | ½ | 75 | 200 |
| Olalla Creek Valley | 23/2E-33F | (b) (6) [redacted] | 390 | 70 x 6 | 6 | 12 | 27 | 100 |
| Burley Creek Valley | 22/1E-1P | [redacted] | 130 | 638 x 8-6-4 | 8 | 40 | 50 | 400 |
| | 4K | [redacted] | 280 | 99 x 6 | 3 | 20 | 32 | 100 |
| | 14B | [redacted] | 65 | 122 x 6 | 28 | 5 | 24 | 300 |
| | 12N | [redacted] | 20 | 220 x 6 | + | ---- | 600 Flow | ---- |
| | 15M | [redacted] | 245 | 194 x 8 | 124 | 56 | 200 | 200 |
| | 23E | [redacted] | 250 | 169 x 6 | 10 | 5 | 7 | 120 |
| | 23K | [redacted] | 10 | 49 x 6 | 26 | 3 | 24 | 100 |
| | 24C1 | Peninsula School Dist. 401 | 80 | 153 x 6 | 33 | 45 | 60 | 150 |
| | 24C2 | (b) (6) [redacted] | 35 | 105 x 6 | + | ---- | 60 Flow | ---- |
| | 24F | [redacted] | 40 | 151 x 6 | + | 30 | 40 | 150 |
| | 22/2E-17M | [redacted] | 345 | 124 x 6 | 107 | 1 | 20 | 250 |

Table 7. WELLS CAPABLE OF PRODUCING MODERATE TO LARGE SUPPLIES OF GROUND WATER ON THE SOUTHERN UPLAND. (continued)

| General area | Well Number | Owner/Tenant | Altitude | Depth and Diam. | SWL | Dd | Yield (gpm) | Capacity (gpm) |
|---|---|---|---|---|---|---|---|---|
| Gig Harbor-Crescent Creek valley | 21/2E-5K | Harbor Springs Water Company | 70 | 156 x 10 | 46 | 24 | 40 | 120 |
| | 22/2E-32G | (b) (6) | 85 | 175 x 6 | + | ---- | 100 Flow | |
| | 32P | Town of Gig Harbor | 30 | 120 x 10 | + | 75 | 400 | (Flows 30 gpm) |

of Port Orchard some difficulty has been experienced in developing large ground-water supplies, owing undoubtedly to the wells not being drilled deep enough to go beneath the sands and silts of Colvos Sand and Kitsap Formation which in this area are not saturated much above sea level. It is probable that wells drilled 100 to 200 feet below sea level would tap the more productive deeper sands and gravels of the Salmon Springs(?) Drift and older deposits.

Blackjack Creek valley, a few miles south of Port Orchard, is one of the more important farming districts of the southern upland. This upland valley is surrounded by till-mantled uplands which rise to 200 feet above the valley floor. The valley floor and lower parts of the surrounding slopes are underlain by Colvos Sand and probably some Vashon recessional outwash sands. To date only one or two wells have been drilled in the Blackjack Creek valley for the purpose of irrigation, most wells being used for domestic supply or small community systems. Most irrigation water in the valley is obtained from Blackjack Creek and adjacent tributaries. However, with proper well construction and penetration into the deeper aquifers in the Colvos Sand and Salmon Springs(?) Drift, wells in this area should produce 50 to 100 gallons a minute. As the water table here lies slightly above creek level, shallow dug or drilled wells tapping the finer valley sediments adjacent to the streams produce sufficient quantities of water for domestic purposes. Depth to water beneath the slopes rising from the valley floor generally increases with distance from the streams.

A low divide separates the drainages of northward-flowing Blackjack Creek and southward-flowing Burley Creek, although both drainages together form a shallow north-south trending trough. The Burley Creek valley, like the Blackjack Creek valley, is underlain by the Colvos Sand and Vashon recessional outwash. Here, too, ground-water development for irrigation purposes has been small, with most irrigation water being supplied from Burley Creek and tributaries. In the upper Burley Creek valley it is probable that moderate to large supplies of ground water can be obtained from wells drilled to depths of 200 to 400 feet and tapping the deeper aquifers of the Colvos Sand and underlying Salmon Springs(?) Drift.

In the lower part of Burley Creek valley, near Burley and Purdy, several wells, penetrating confined aquifers in the Salmon Springs(?) Drift and pre-Salmon Springs(?) deposits 200 to 375 feet below sea level, have produced large artesian flows. Artesian flow has been obtained from such wells located less than 120 feet above sea level along the valley slopes, with artesian pressure increasing in those wells drilled at lower altitudes. Water obtained from these deeper aquifers has an odor of hydrogen sulfide. On the uplands bordering the Burley Creek valley small domestic supplies are obtained from shallow dug wells penetrating water bodies perched on the till.

Another major shallow trough lies in the eastern part of the southern upland and is herein called the Curley Creek-Long Lake-Olalla Creek valley. Beginning near Colby on Yukon Harbor at 24/2E-33R, the valley ascends at a low gradient southwesterly up the Curley Creek drainage to Long Lake, beyond which a low drainage divide is crossed and the Olalla Creek valley descends in an equally low gradient southeasterly to Olalla Bay on Colvos Passage at 22/2E-3M. The entire length of the valley is underlain by Colvos Sand and Vashon recessional deposits, and the water table is shallow along the valley floor, being slightly above stream and lake level in most places. Most of the domestic requirements of the small farmsteads occupying the stream valleys and the waterfront homes on Long Lake are supplied by shallow dug and drilled wells and by the numerous springs which issue along the slopes adjacent to the valley floor. Irrigation of small farms is done almost entirely from the creeks occupying the valleys. It is probable that moderate to large supplies of ground water may be developed through wells drilled into the deeper aquifers of the underlying Salmon Springs(?) Drift. On the uplands adjacent to the valley, domestic supplies are obtained from shallow dug wells tapping small local aquifers perched on the till.

Point Glover is a rural residential area five miles northeast of Port Orchard. As most of the area is underlain by Tertiary sedimentary rocks of the Blakeley Formation, there has been little ground-water development there. Springs issuing along the surface of the bedrock and draining small pockets of sand and gravel supply some domestic requirements. A few wells supply two to three gallons per minute, but the large community supply systems must pipe water from wells drilled into thicker unconsolidated Pleistocene materials a mile and a half south of the Point. A 136-foot deep U.S. Navy well (24/2E-16K) yields about 400 gallons a minute, and well 24/2E-16L, belonging to Watauga Beach Community Water Company, 141 feet deep, has a capacity of 600 gallons a minute from these materials.

Blake Island located in Puget Sound one and a half miles north of Point Southworth has in recent years been the subject of much speculation as to the possibility of obtaining an adequate supply of ground water for the requirements of Blake Island State Park. Several test holes were drilled before well 24/2E-25P was drilled at an altitude of 160 feet near the highest point on the island. The well was drilled to a depth of 190 feet and yielded about 50 gallons a minute. The water level stood at about 15 feet above sea level.

Table 8. WELLS CAPABLE OF PRODUCING MODERATE TO LARGE SUPPLIES OF GROUND WATER ON VASHON AND MAURY ISLANDS.

| General area | Well Number | Owner/Tenant | Altitude | Depth and Diam. | SWL | Dd | Yield (gpm) | Capacity (gpm) |
|---|---|---|---|---|---|---|---|---|
| Vashon Island | 21/2E-1M | (b) (6) [redacted] | 300 | 183 x 6 | 138 | 4 | 20 | 150 |
| | 22/2E-24K | | 300 | 193 x 8 | 129 | 10 | 50 | 200 |
| Maury Island | 22/3E-16F | Queen City (KIRO) Broadcasting Co. | 60 | 462 x 8 | 55 | 60 | 40 | 300 |
| | 21J | (b) (6) [redacted] | 400 | 518 x 6 | 378 | ? | 25 | 25+ |
| | 22K | Boise-Cascade Corp. | 210 | 348 x 12 | 203 | 26 | 300 | 300+ |
| | 23D | Wise Investment Co. | 400 | 382 x 8 | 338 | 17 | 30 | 300 |
| | 31J | (b) (6) [redacted] | 360 | 493 x ? | ---- | ---- | 40 | 40+ |
| | 32C | Bard & Howard | 240 | 423 x 12 | 238 | 80 | 128 | 200 |

Table 9. WELLS CAPABLE OF PRODUCING MODERATE TO LARGE SUPPLIES OF GROUND WATER ON THE GIG HARBOR PENINSULA AND FOX ISLAND.

| General area | Well Number | Owner/Tenant | Altitude | Depth and Diam. | SWL | Dd | Yield (gpm) | Capacity (gpm) |
|---|---|---|---|---|---|---|---|---|
| Upland north of Narrows Bridge | 21/2E-8C | Town of Gig Harbor | 60 | 375 x 18 | ---- | 31 | 340 | 340+ |
| | 17K | (b) (6) [redacted] | 320 | 397 x 8 | 220 | 5 | 100 | 500+ |
| | 21C | Westbridge Water Co. | 200 | 255 x 8 | 195 | 7 | 35 | 150 |
| Wollochet Bay | 21/2E-24J | (b) (6) [redacted] | 10 | 35 x 6 | + | 19 | 60 | 70 |
| | 30D | | 40 | 66 x 6 | 28 | 6 | 20 | 80 |
| | 30F | | 40 | 65 x 6 | 35 | 25 | 66 | 50 |
| | 30D | Wollochet Harbor Club & (b) (6) [redacted] | 130 | 193 x 8 | 125 | 10 | 80 | 400 |
| Fox Island | 20/2E-6N | (b) (6) [redacted] | 75 | 119 x 8 | 70 | 13 | 45 | 100 |
| | 2Q | | 200 | 122 x 6 | 62 | 15 | 40 | 80 |

Other parts of the southern upland are not heavily populated and little information is available on the ground-water potential except along the shoreline areas of Case Inlet, Henderson Inlet and Colvos Passage. There beach homes obtain water from spring zones located along the upper surface of the Kitsap Formation near beach level, and from wells drilled to depths that tap ground water near sea level. Most are 6-inch wells that were bail-tested at 20 to 100 gallons a minute, and obtain water from the Colvos Sand and Salmon Springs(?) Drift gravels. The western half of the southern upland is largely mantled by thick deposits of coarse gravels of Vashon ablation till and recessional outwash; these deposits have discouraged development of the area for farmsteads and little information is therefore available on the ground-water potential there. The few small farms located along stream valleys and summer homes located on the shores of small lakes scattered across this part of the southern upland obtain water supplies from these surface-water bodies or from shallow wells dug adjacent to the streams and lakes.

## VASHON-MAURY ISLANDS

As in other upland areas of the Kitsap Peninsula, Vashon and Maury Islands are underlain by varying thicknesses of Vashon Drift. The development of ground-water supplies on these islands has been limited chiefly to shallow dug domestic wells that supply the farmsteads not otherwise served by community water systems. A few deeper drilled wells obtain water for irrigation of some upland farms and for small group domestic supplies. Drillers' records and data on pump tests and well yields are lacking for much of the area. In a few places on the uplands domestic supplies are obtained from large cisterns constructed to capture rainfall from roof drain-pipes.

Although springs have provided the primary sources of community water supplies for Vashon and Maury Islands, future development and residential growth of the islands will depend more heavily upon ground-water supplies developed from deeply drilled wells. Moderate supplies of ground water are probably available to wells that tap deeper aquifers in the Colvos Sand and in the Salmon Springs(?) Drift. Near sea level along shoreline areas water can be obtained locally from relatively shallow wells. On the upland areas the water table stands at altitudes of 100 to 200 feet above sea level.

## GIG HARBOR PENINSULA-FOX ISLAND

The upland areas of the Gig Harbor peninsula and Fox Island are mantled in most places by Vashon till and recessional outwash which supply perched ground water to shallow dug domestic wells. The till also serves to underlie spring zones on the uplands. Springs also occur at the upper surface of the Kitsap Formation exposed along shoreline bluffs, and provide local domestic supplies although no large quantities of surface water have been developed on the peninsula for community supplies.

Drilled wells obtain water at or slightly above sea level along the shorelines of the peninsula and Fox Island. Farther inland the water table rises and deeper wells drilled on the uplands tap aquifers in the Colvos Sand and Vashon advance outwash at elevations of 50 to 150 feet above sea level in most places.

## LONGBRANCH PENINSULA

The Longbranch peninsula is mantled in most places by Vashon till, with pockets of recessional sands and gravels overlying the till in local depressions. Several small lakes and marshy areas are perched on the underlying till. Some upland areas, along the highway south of Key Center and the adjacent slopes leading eastward to Carr Inlet (21/1E-7) are underlain by a thick sequence of recessional sand and Colvos Sand. The broad stream valley heading Whitman Cove at 20/1W-16 and extending northward toward Home is also composed predominately of a thick sequence of brown sand that is either Vashon recessional outwash or Colvos Sand.

Most of the water for irrigation supplies developed on the peninsula comes from small ponds and lakes scattered over the upland and from the few small streams that drain the upland. A few marshy areas have been developed for irrigation and stock supply ponds by earth dams. Along the shoreline of the peninsula local springs issuing from the upper surface of the Kitsap Formation provide domestic supplies for beach homes.

Ground-water development on the Longbranch peninsula has been limited mostly to shallow dug or drilled domestic wells; only a few deep wells have been drilled to obtain water from saturated sands and gravels in the Vashon advance outwash and Colvos Sand. The water table is close to sea level along the shoreline but further inland it occurs at elevations considerably higher than sea level. Due to the lack of deep drilling in most of the upland area, there is only limited information on the availability of ground water. However, with the anticipated future growth of the area will come an increasing demand for development of ground-water supplies.

Herron Island has been developed as a residential community. .The domestic water supply is obtained from a well drilled nearest the highest point of the island, at the 120-130 foot altitude. The well is 200 feet deep and has a static water level which has been measured at, and slightly below, sea level. This situation would suggest the possibility of saltwater contamination, although under present use and pumping conditions the water is reported to be of good quality.

## ANDERSON ISLAND

The small present demand for domestic water supplies for beach homes on Anderson Island has been satisifed by small springs that issue at the upper surface of the Kitsap Formation along the shoreline slopes of the island and by shallow dug or drilled wells that obtain ground water near sea level. A few upland homes obtain domestic supplies from shallow ground water perched on the till.

The future development of the waterfront properties of Anderson Island will undoubtedly increase the demand for ground water as a source of water supply. To date little exploration has been made of the ground-water potential of the island; however, geologic evidence suggests that wells drilled on the upland should penetrate saturated portions of the Colvos Sand and gravels at elevations of 25 to 75 feet above sea level. Deeper wells drilled through both the Colvos sand and underlying Kitsap Formation should obtain moderate to large supplies of ground water from gravels within the Salmon Springs(?) Drift or pre-Salmon Springs(?) deposits. It is recommended that exploratory drilling be conducted in the central upland portions of the island to determine the water-bearing characteristics of the formations underlying the Vashon Drift.

# RECORDS OF WELLS

During the course of the investigation of Kitsap County proper by Sceva (1957) more than 1,200 wells were scheduled and data for 1,146 were tabulated. Of the wells tabulated 565 were dug, 570 were drilled, 5 were jetted, 2 were bored and 1 was driven; three deep oil test wells were also listed.

Information on wells located in the Mason, Pierce, and King County parts of the present study area was obtained from both well drillers and from drillers' records filed with the Division of Water Resources in conjunction with processing of ground-water rights. In some areas barren of such information a spot-check well canvass was conducted. Many areas, as shown on Plate 2, are relatively barren of data on water levels and well capacities due in large part to the lack of development of ground water as a source of supply. Since shallow dug wells greatly outnumber drilled, bored, and driven wells in the study area, it is presumed that shallow ground water is available for domestic supplies in most places.

Owing to space limitations a detailed tabulation of well logs and pump capacities of all recorded wells has not been included in this report, although for each well spotted on Plate 2 a record is maintained in the files of the Division of Water Resources. These records are available upon request, with detailed drillers' logs being available for those wells shown by solid square or circular dot.

For those wells shown in the diagrammatic geologic cross sections on Plate 1, a detailed tabulation of well logs is presented in Appendix A.

# GROUND-WATER DEVELOPMENT

## DEEP WELLS

Except in a few notable cases, wells that penetrate the deeper deposits underlying the Kitsap Peninsula have been generally unsuccessful in producing large supplies of ground water. This is due primarily to the fineness and general impermeability of the materials encountered at depths generally greater than 150 feet below sea level, where the pre-Salmon Springs(?) deposits, undifferentiated, are found. In several of the more productive deep wells the location of the chief aquifers is not known because the casings are usually perforated at numerous horizons.

Within Kitsap County proper, Sceva (1957) has tabulated 28 wells drilled to depths of 500 feet or more. Of these, 10 have been abandoned owing to insufficient yield or excessive drawdown. In three of the abandoned wells Tertiary sedimentary rocks are known to have been penetrated. Eighteen of the deep wells are in use. Of these, eight are capable of yielding large supplies, seven yield small to moderate supplies, and the yield of the remaining three is unknown. The foregoing data would infer that considerable risk is involved in the construction of deep wells except in areas of known production.

## SHALLOW DRILLED WELLS

Drilled wells that have most successfully produced ground water in the report area are those that have tapped the sand and gravel aquifers occurring within the saturated lower portions of the Colvos Sand. The aquifers usually occur below the regional water table which lies above sea level along the shorelines and rises inland to 100 to 150 feet or more above sea level. Deeper gravel aquifers within the Salmon Springs(?) Drift also produce moderate to large supplies of ground water, normally from depths at or slightly below sea level. However, although the Salmon Springs(?) Drift is usually found below the water table and the sands and gravels are therefore normally saturated, the presence of this formation below the overlying Kitsap Formation is not usually known until drilling tests have proven its existence in a given location. For that reason test drilling is recommended.

## DUG WELLS

In many of the settled upland areas within the report area minimum domestic supplies are obtained from perched ground water tapped by shallow dug wells. In most cases the construction of such wells have not required the services of well drillers, and little information on those wells has been reported through drillers' records. However, a field canvass of the report area has shown that a large part of the upland's domestic requirements has been supplied from dug wells. Such wells, owing to penetration of the till mantle ("hardpan"), may not require casing, but where lined they are usually cased with three-foot diameter tile. The shallow dug wells are normally 15 to 30 feet deep.

## SPRINGS

Many springs and seeps issuing from the top of impermeable silts and clays of the Kitsap Formation and Colvos Sand exist throughout the report area. The silts and clays serve as a perching layer to the downward percolation of much of the precipitation that falls upon the area. The springs provide an important part of the base flow of surface streams, and have satisfied the domestic requirements for both individual homes and communities throughout the area.

## WATER LEVELS

In most places in the report area, the depth to water in wells is within 100 feet of the land surface. Wells having a greater depth to water are generally located near deep gullies or steep slopes leading to Puget Sound where natural ground-water discharge drains the shallower materials. Many of the wells that have depths to water of less than 50 feet are located at low altitudes or adjacent to streams and lakes in upland valleys. Dug wells are usually less than 25 feet deep and are located either adjacent to streams or lakes, or on uplands where they tap small bodies of perched ground water. These latter wells usually experience considerable seasonal fluctuation of water level, such perched ground water being normally characterized by rapid response to precipitation.

Plate 2 shows the location of wells throughout the study area and includes figures (in blue) that give the altitude above sea level of the water surface. Depth to water level from land surface can be calculated by subtracting these figures from the land surface elevation as interpolated from the topographic contour lines shown on U.S. Geological Survey quadrangles.

The water table is not a static surface but fluctuates due both to seasonal changes in amounts of precipitation that recharge the ground-water body and to the amount of ground-water discharge, either by pumping or by variations in the discharge of springs throughout the year. Some wells were measured periodically over several years to determine the trend and approximate annual range in fluctuation. Hydrographs of three of these wells are shown in Figure 24. These wells were selected partly because they show a comparison between the seasonal fluctuations in relatively shallow water-bearing zones and in deeper aquifers. It can be noted that while the two shallow wells have fluctuations of up to 15 feet, the deeper well has a fluctuation of only 4 to 6 feet. The difference is due primarily to the more shallow aquifers responding more quickly to the fluctuating pattern of precipitation throughout the year and frequently represent only perched, local ground-water conditions, whereas the water levels of deeper aquifers reflect the more stable cumulative effect of annual precipitation and represent the regional water table. It is also noted that, with increasing depth and with all other conditions being equal (such as permeability of materials), a greater time-lag is experienced in the response of the water table to recharge by annual precipitation. Shallow wells will normally attain their highest water levels within a month following the peak of precipitation, whereas the deeper wells may not experience their highest water levels until 3 to 4 months after the maximum precipitation.

The period of lowest water levels occurs in the late autumn or early winter months. Many owners of dug wells have found it convenient to deepen their wells during this period. High water levels occur in late winter, spring, or early summer months, depending upon the depth to the water table and upon the permeability of the overlying materials.

Because the period of low water levels in many wells corresponds in time with the first frost and accumulation of snow packs in the Cascade and Olympic Mountains, and high water levels often correspond in time to periods of greatest snowmelt and runoff in the mountains, a popular misconception has evolved claiming that ground water in the Kitsap Peninsula is derived from snowmelt in the Cascade and Olympic Mountains. However, the great depth of the surrounding waterways of Puget

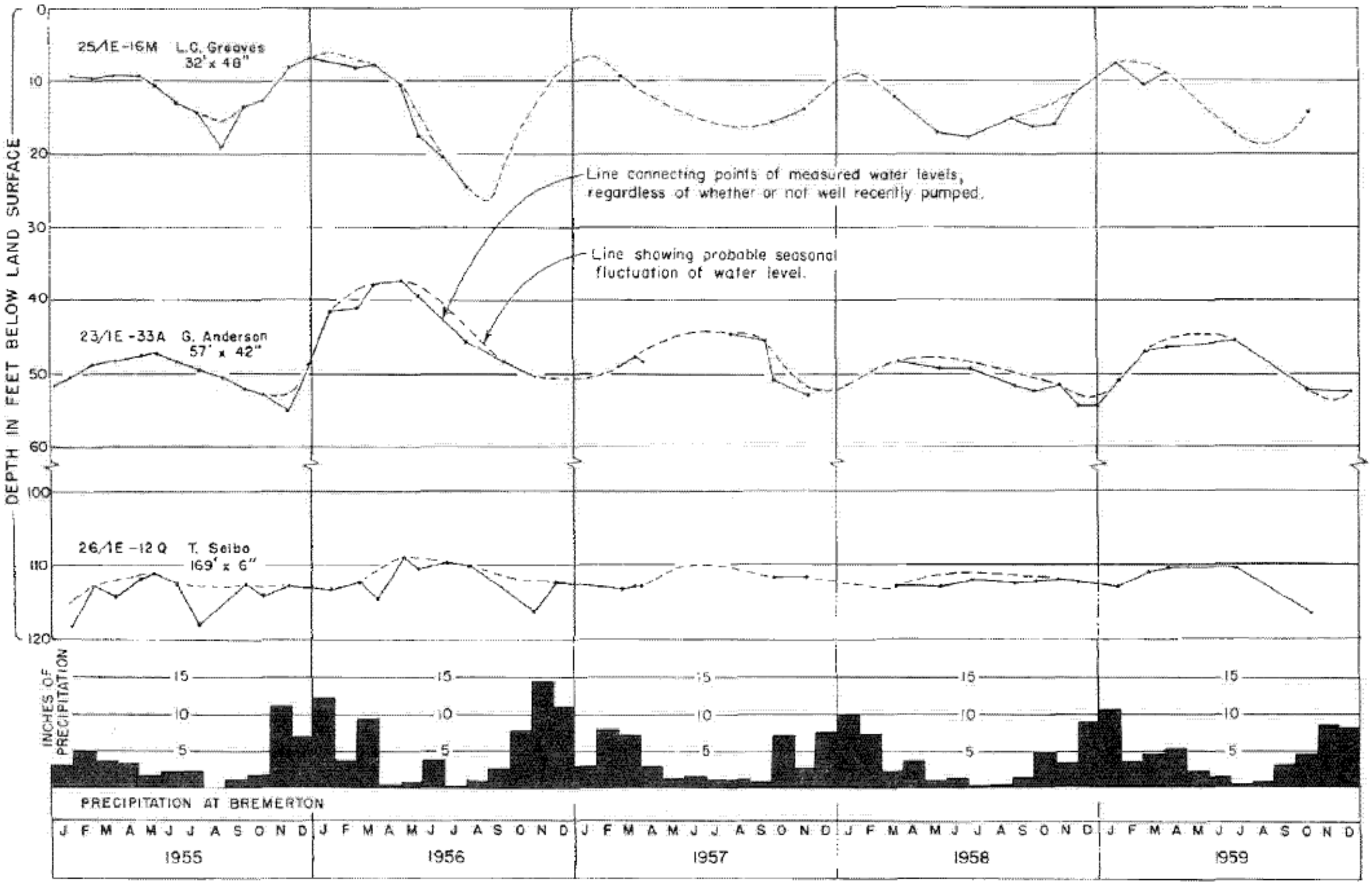



Figure 24. PRECIPITATION AT BREMERTON AND HYDROGRAPHS OF THREE WELLS IN THE KITSAP PENINSULA. Shows time relationship between precipitation and water levels in wells of varying depths.

Sound and the general movement of ground water toward these waterways within the report area preclude any recharge from these sources. All recharge comes from precipitation falling directly on the project area and percolating to the water table.

Studies made by Sceva (1957) of a water-table well, a perched lake lying in a closed depression, and a stream were compared with the monthly distribution of precipitation. It was shown that Panther Lake (24/1W-31) and Blackjack Creek near Port Orchard reflect an almost immediate response to late summer precipitation. The well, however, did not respond until several months after the rains had commenced. The level of Panther Lake would probably correspond to fluctuations of shallow perched ground water.

## PERENNIAL YIELD

The perennial yield of an aquifer is defined as the rate at which ground water can be withdrawn without depleting the aquifer beyond the point of its being annually recharged. Withdrawals in excess of that rate will cause a lowering of the water table and, consequently, a reduction of the base flow of surface streams and, in places, encroachment of water of inferior quality.

Plate 4 shows that the average annual precipitation on the Kitsap Peninsula ranges from less than 26 inches in the northern part to more than 80 inches in the central part. Only a part of the precipitation reaches the water table, and only a part of this becomes available for ground-water withdrawal. Sceva (1957) estimates that in areas having 25 to 30 inches of precipitation the perennial yield might be as much as 1 acre-foot per acre per year, and in areas having 50 to 70 inches of precipitation the perennial yield will be as much as 2 to 3 acre-feet per acre per year. However, the local geologic setting, especially in the presence of thick capping layers of relatively impervious till, will reduce those estimates for many places.

At present, only a small part of the available ground water is being withdrawn. However, the rapidly increasing development of the Kitsap Peninsula and adjacent islands will undoubtedly be paralleled by an increase in ground-water withdrawal through both individual domestic wells and community supply wells. Accordingly, in some areas pumping may eventually exceed perennial yield and will result in a gradual lowering of the water table and, in some shoreline areas, possible encroachment of saline waters.

## ARTIFICIAL RECHARGE

As naturally-occurring ground waters have adequately supplied the domestic and community wells in the report area, there has been to date no demand for a study of the possibilities for artificial recharge of the Peninsula's aquifers.

In addition to a demand for additional ground-water storage, an effective program of ground water-recharge must require two principle conditions: (1) an aquifer which is capable of receiving additional water at a rate that exceeds natural ground-water discharge, and (2) an available source of good-quality water to be introduced into the aquifer.

In the Kitsap Peninsula it is believed that some aquifers would be capable of receiving additional water by artificial recharge, especially during the summer months. However, large supplies of surplus water would be needed to make such a program practical and the accomplishment of a large-scale artificial recharge program, therefore, might not be possible without costly import of large quantities of water from outside the report area. Furthermore, as the strata of unconsolidated, water-bearing sands and gravels are essentially horizontal throughout the report area, and above sea level are generally truncated at sea cliffs and valley sides, there is normally a natural loss of some of the ground water by lateral seepage, both to surface springs and streams and to surrounding marine waters. Under such conditions, additional water introduced into certain aquifers would probably not be retained to any extent.

# SURFACE-WATER RESOURCES

By M. E. Garling*

## GENERAL

As a consequence of its highly irregular configuration the Kitsap Peninsula is drained by hundreds of small stream systems. Only 12 streams in the area have surface drainage areas that exceed 10 square miles and most are less than 1 square mile. Because much of the region lies in the rain shadow of the Olympic Mountains, mean annual precipitation in this area is generally lower than that received in most other parts of western Washington. This combination of small drainage basins and low precipitation, in most cases, makes it exceedingly difficult and costly to concentrate and develop appreciable quantities of surface water. Nevertheless, many of the streams do produce a sufficient continuous supply to maintain the household needs of riparian owners. For this reason and because of the great residential attractiveness of the area, it appears that the majority of future surface-water developments will be concerned primarily with small quantities of water for domestic supplies. An effort was therefore made in the following sections to inventory and summarize all available data on surface waters and to analyze all streams in the report area regardless of size or apparent importance.

## STREAMFLOW CHARACTERISTICS

### SHORT-TERM VARIATIONS

Areal distribution and occurrence of precipitation, and geohydrologic characteristics of each watershed are the two most influential factors controlling daily and seasonal streamflow variations in the Kitsap Peninsular region. Nearly all the streams follow a seasonal pattern of high flows in winter and low flows in summer with transition periods in the spring and fall. This is clearly illustrated in figures 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, and 72 which show, by means of bar graphs, the monthly range in flows that have occurred in several streams within the report area. The larger, short-duration fluctuations in streamflow which usually occur over a period of days, almost without exception, are the result of direct runoff immediately following storms. Figures 25, 26, 27, and 28 are selected streamflow hydrographs of some of the larger streams in the report area, and they show that peak discharges usually occur during the months of November through March. After each peak discharge recedes, subsurface storm runoff and ground-water runoff become the major contributors to streamflow. The ground-water runoff maintains a base flow in streams during the usual precipitation-deficient summer period with the magnitude of its contribution being directly related to water storage and transmission characteristics of aquifers within and around each basin.

The complex glacial materials found underlying most of this area makes it difficult to determine the exact location and extent of aquifers, but there is definite evidence that many are continuous beneath several drainage basins. In some cases the direction of ground water movement is independent of surface topography, and under such conditions, some of the precipitation received in one watershed could be transferred as ground water in the aquifers to adjacent or nearby basins. If stream channels in the adjacent or nearby basins intercept such water-bearing materials, some of the water will eventually be discharged into their systems. This transfer of ground water from one basin to another obviously occurs in many perimeter areas along the shores of the Kitsap Peninsula and nearby islands where small spring-fed streams often produce more annual runoff than could be collected from precipitation within their own topographic basin boundaries. Large contributions of ground water have the effect of producing a relatively constant flow throughout the year below the area where discharge from the aquifer occurs. Upstream from the areas where ground water is discharged, smaller streams generally become dry after direct storm runoff has drained from the watershed. Also, certain streams will become completely dry at times if there is insufficient ground water in storage to maintain perennial flows.

Natural storage provided by many lakes and marshes located throughout the Kitsap Peninsula also helps to maintain streamflow during the summer drought period (table 50). Sizeable quantities of runoff water are retained in these reservoirs and slowly released to outlet streams. Although some precipitation is received as snow during the winter months, storage in this form is short-lived and does not have any appreciable regulatory effect on streamflow.

### LONG-TERM VARIATIONS

Since there was no continuous-record stream gaging in the report area prior to 1945, long-term annual streamflow variations are somewhat uncertain. The longest streamflow record available for estimating past long-term trends is provided by the Gold Creek gage located about eight miles west of Bremerton. This gage has been in continuous operation since 1946 and correlation studies of annual discharge among all major gages show that Gold Creek is highly representative

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*Author of SURFACE-WATER RESOURCES section except for parts entitled BASIC STREAMFLOW DATA and FLOODS IN THE REPORT AREA which were submitted by the Surface-Water Branch of the U. S. Geological Survey, Tacoma, Washington; Earl G. Bailey, Hydraulic Engineer, author.

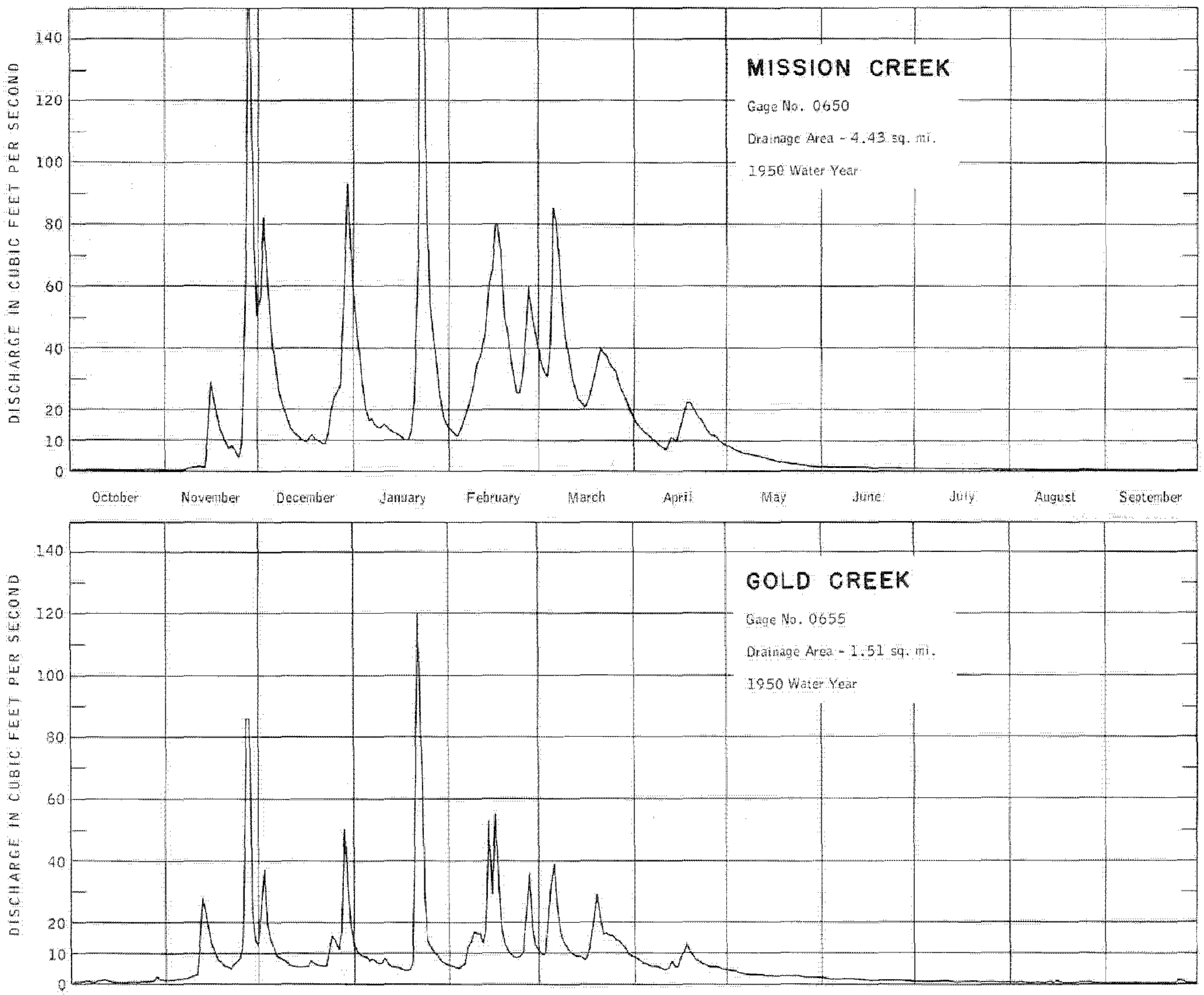



Figure 25. STREAMFLOW HYDROGRAPHS OF MISSION AND GOLD CREEKS.

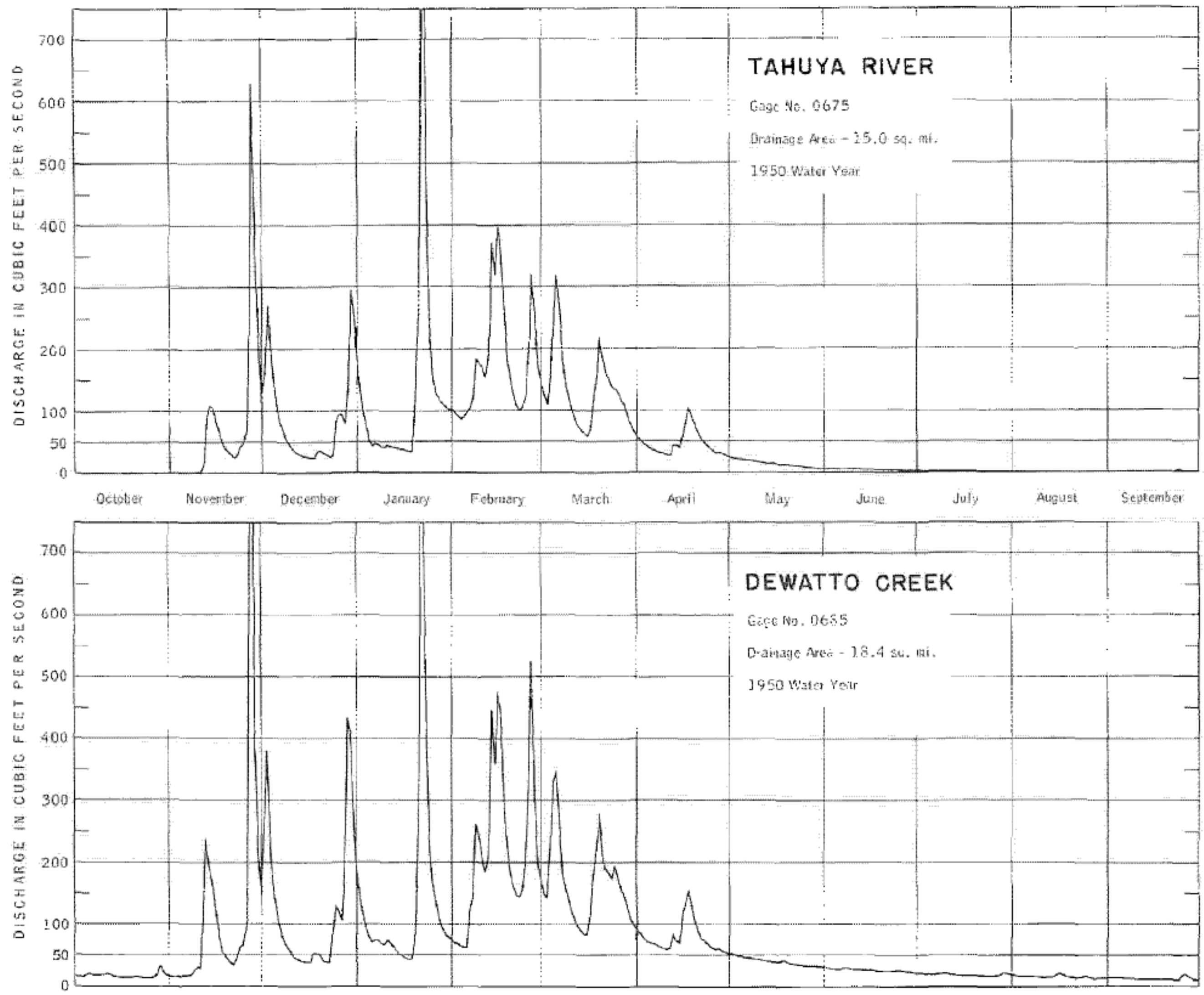
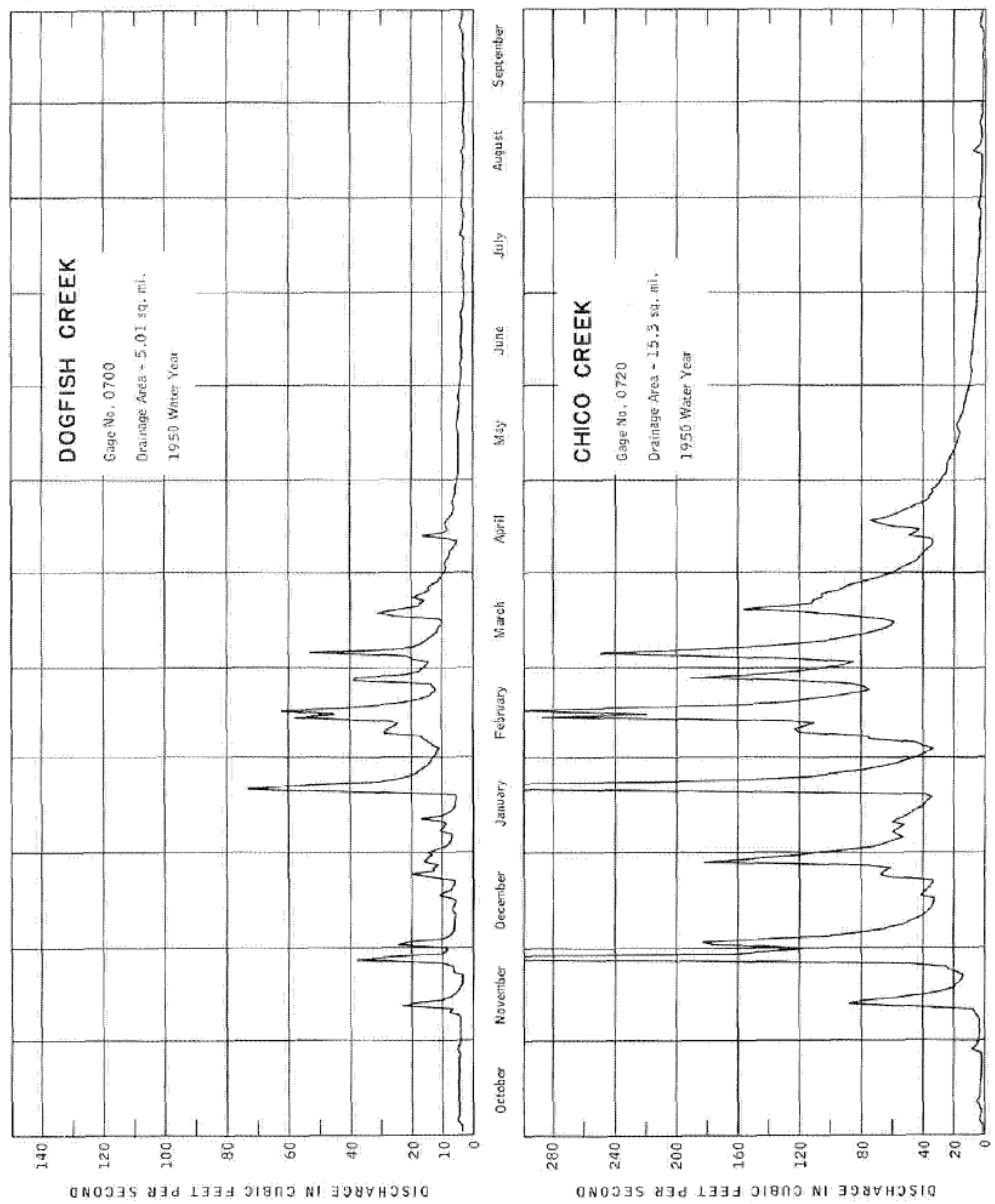
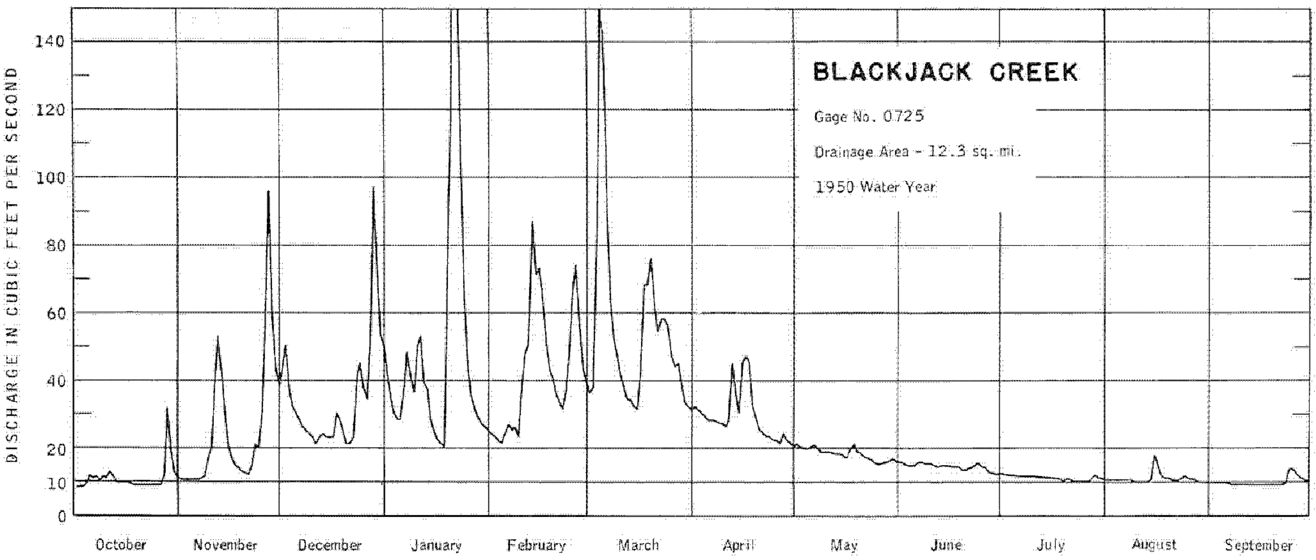



Figure 26. STREAMFLOW HYDROGRAPHS OF TAHUYA RIVER AND DEWATTO CREEK.

Figure 27. STREAMFLOW HYDROGRAPHS OF DOGFISH AND CHICO CREEKS.





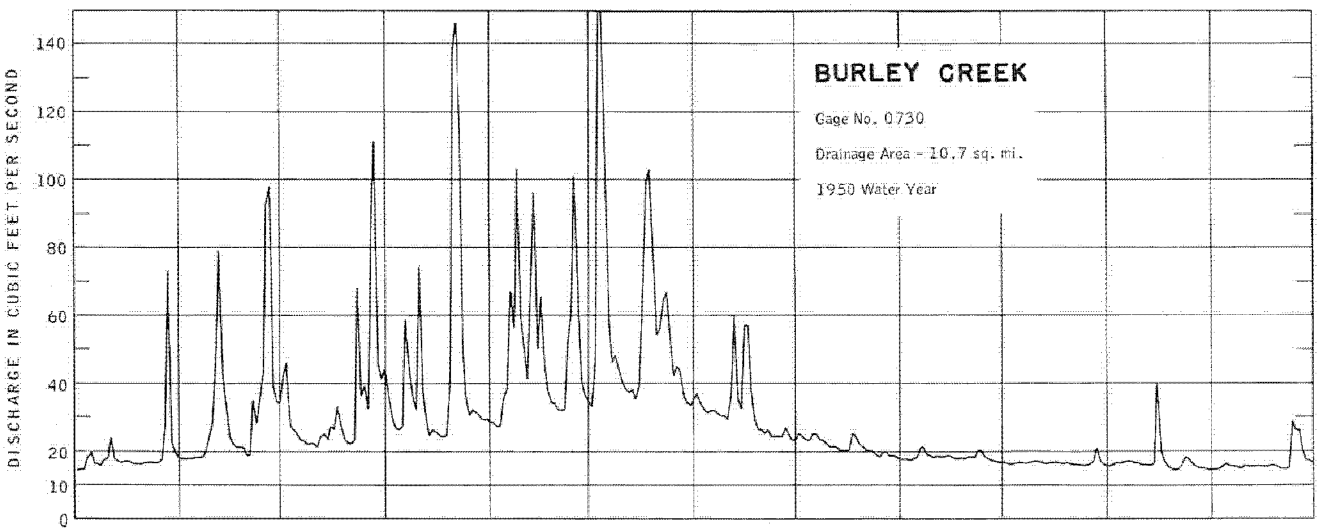
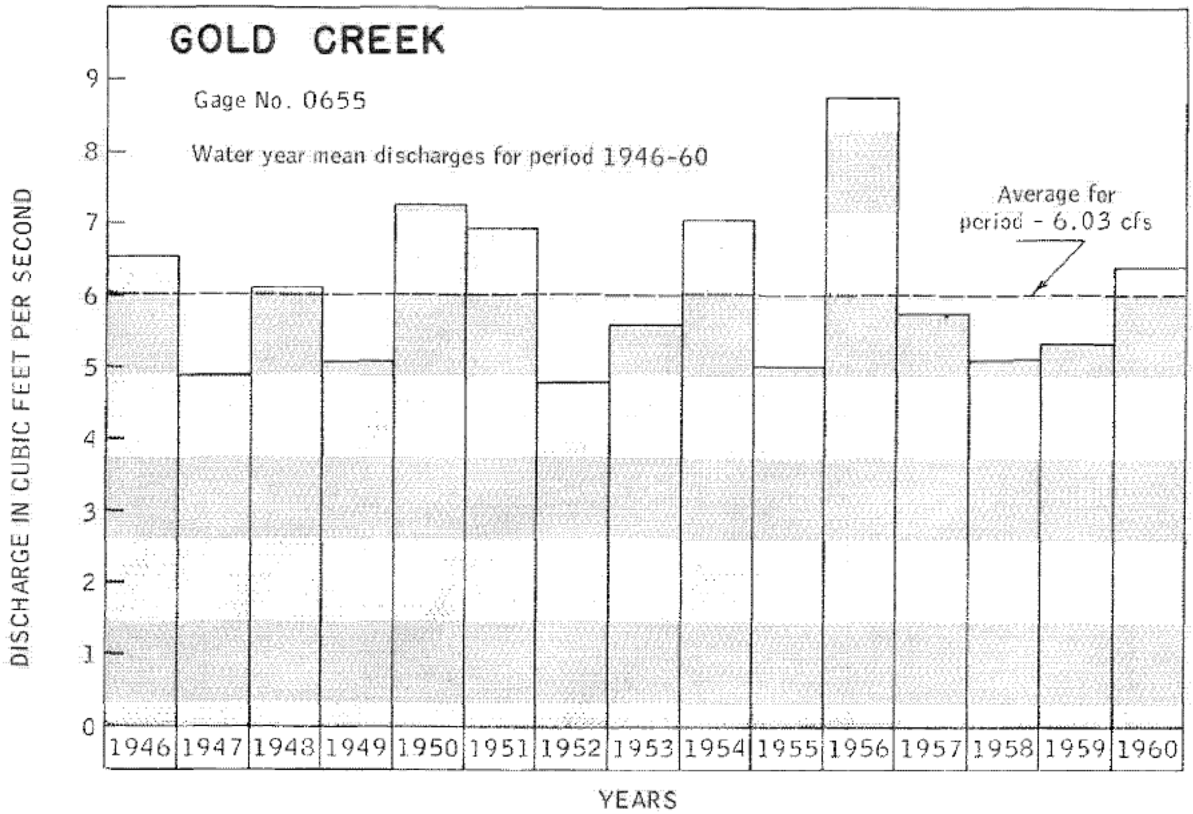




Figure 28. STREAMFLOW HYDROGRAPHS OF BLACKJACK AND BURLEY CREEKS.

Figure 29. WATER-YEAR MEAN DISCHARGES FOR GOLD CREEK




of general trends throughout the area. A graphic representation of this record is, therefore, presented in figure 29 as a relative indicator of conditions during the period 1946-60. Individual statistics showing the variability of annual runoff for this drainage basin and others in the area are listed in table 49. Insight on annual streamflow trends prior to 1946 can be gained through use of synthetic annual runoff ratios explained on page 109.

## BASIC STREAMFLOW DATA

By E. G. Bailey, U.S. Geological Survey

Basic streamflow data consist of records of streamflow collected at gaging stations and the results of discharge measurements made at other sites. The streamflow data collected at gaging stations usually are published as records of daily discharge in cubic feet per second (cfs); as monthly discharge in cubic feet per second and in acre-feet; and as yearly discharge in acre-feet. In addition, where the flow at a station is not appreciably affected by upstream regulation or diversion, monthly and yearly discharge figures are also given in cubic feet per second per square mile and as depth in inches for the drainage basin. Discharge measurements made at sites other than gaging stations are made by current meter or by indirect methods that utilize the slope of the channel as indicated by high-water marks, and data on the size, shape, and roughness of channels or of bridge and culvert openings.

Streamflow data have been collected at 18 gaging stations in the Kitsap Peninsula area, several of which have only short periods of record. The short-term records are from gaging stations operated during low-flow summer seasons in conjunction with a series of measurements made to inventory the low flows of streams in the area. Five years or more of continuous discharge records were collected at 11 of the gaging stations. Streamflow data for all the stations are summarized in this report. In addition, records of discharge for the stations that have been in continuous operation for 5 years or more are analyzed and presented in several ways as described in the following pages.

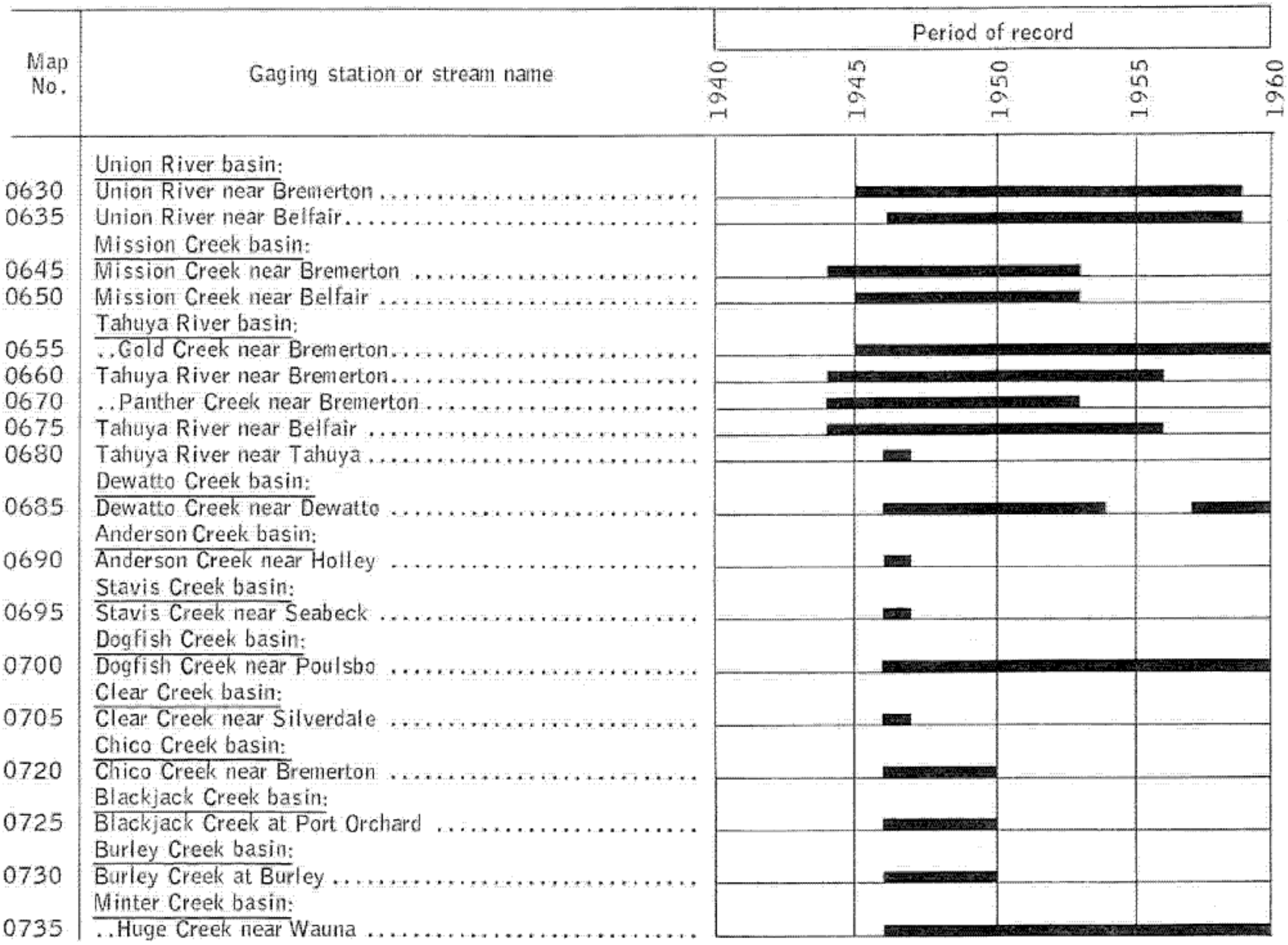
## BAR CHART OF GAGING STATION RECORDS

All gaging stations that have been operated in the report area are listed in the bar chart on page 57, which shows the years during which each station was operated. The streams are listed in clockwise order around the Kitsap Peninsula. The stations on each stream are listed in downstream order where two or more stations are located on one stream. Stations on a tributary that enter above a main-stem station are listed before that station. If a tributary enters between two main-stem stations, the tributary station is listed between them. Tributary streams are indicated by indention. Each station has been assigned a number that can be used to locate the station on the surface-water map (pl. 3).

## SUMMARY OF DATA

Basic data that have been collected at gaging stations and at miscellaneous discharge measurement points in the report area are summarized in tables 10 and 11. More detailed data for each station will generally be found in water-supply papers published by the U.S. Geological Survey or in bulletins published by the State of Washington.

Figure 30. BAR CHART OF GAGING STATION RECORDS.




The data presented in table 10 are, for the most part, self-explanatory; only those items that may need further explanation are described here. The stations in the table are listed in downstream order as described under "Bar chart of gaging station records." The elevation shown for each gaging station is the approximate elevation of the bed of the stream above mean sea level. Discharge data are presented on both annual and seasonal bases. Maximum discharge figures are omitted from the extremes columns for records of less than one full year. Maximum and minimum discharge figures are for the period of record indicated at each station.

Table 11 lists selected miscellaneous measurements of discharge at points other than stream-gaging stations. The discharge listed therein is the minimum discharge that has been measured at each site; it is not necessarily the minimum discharge that has occurred in the past or that can be expected to occur in the future. In almost every case, however, each discharge listed approximates the minimum flow at that point during the low-water season in which the measurement was made. When evaluated, such measurements are helpful in appraising the overall water supply and in determining the potential low flow at the places where they were made. At some sites, several measurements have been made in addition to those reported herein; the results of these additional measurements are contained in the U.S. Geological Survey water-supply papers (WSP) listed in the column headed "Publication."

## REGIMEN OF FLOW

The basic streamflow data from 11 of the stations listed in table 10 are summarized and presented in this section to demonstrate the streamflow characteristics and to provide a basis for further study. These gaging stations, each of which has 5 years or more of continuous record, are listed below.

| Map No. | Gaging station |
|---|---|
| 0630 | Union River near Bremerton |
| 0635 | Union River near Belfair |
| 0645 | Mission Creek near Bremerton |
| 0650 | Mission Creek near Belfair |
| 0655 | Gold Creek near Bremerton |
| 0660 | Tahuya River near Bremerton |
| 0670 | Panther Creek near Bremerton |
| 0675 | Tahuya River near Belfair |
| 0685 | Dewatto Creek near Dewatto |
| 0700 | Dogfish Creek near Poulsbo |
| 0735 | Hugh Creek near Wauna |

The data thus summarized are expressed in terms of (1) maximum and minimum daily discharge, (2) maximum, minimum, and average monthly discharge, and (3) duration of

Table 10. SUMMARY OF GAGING STATION STREAMFLOW RECORDS.

| Sta. No. | Name | Location | Drain. area (sq mi) | Elev. ft above m.s.l.) | Period of record | Annual discharge (water year ending Sep- | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Maximum | | Minimum | |
| | | | | | | Acre-feet | Year | Acre-feet | Year |
| 0630 | Union River near Bremerton | SW¼NE¼ sec. 34, T. 24 N., R. 1 W., 1 mile downstream from Casad Dam, 1½ miles upstream from Hazel Creek. | 3.18 | 395 | 1945-59 | 12,420 | 1956 | 6,590 | 1958 |
| 0635 | Union River near Belfair | NE¼ sec. 20, T. 23 N., R. 1 W., 2 miles upstream from mouth and 6 miles downstream from Casad Dam. | 19.8 | 45.6 | 1947-59 | 54,880 | 1956 | 30,940 | 1958 |
| 0645 | Mission Creek near Bremerton | NE¼NW¼ sec. 32, T. 24 N., R. 1 W., on west shore of Mission Lake, 300 ft upstream from lake outlet. | 1.83 | 513.0 | 1945-53 | 6,080 | 1951 | 3,420 | 1947 |
| 0650 | Mission Creek near Belfair | NW¼ sec.18, T. 23 N., R. 1 W., 5 miles upstream from mouth. | 4.43 | 330.0 | 1945-53 | 11,930 | 1951 | 6,160 | 1947 |
| 0655 | Gold Creek near Bremerton | NE¼SW¼ sec. 21, T. 24 N., R. 1 W., 1½ miles upstream from mouth. | 1.51 | 750.9 | 1945 | 6,350 | 1956 | 3,480 | 1952 |
| 0660 | Tahuya River near Bremerton | SE¼ sec. 19, T. 24 N., R. 1 W., 1½ miles downstream from Tahuya Lake. | 5.99 | 540 | 1945-56 | 22,700 | 1956 | 11,600 | 1955 |
| 0670 | Panther Creek near Bremerton | NW¼ sec. 31, T. 24 N., R. 1 W., half a mile downstream from Panther Lake. | 0.98 | 486 | 1945-53 | 2,650 | 1951 | 1,760 | 1947 |
| 0675 | Tahuya River near Belfair | SE¼SE¼ sec. 10, T. 23 N., R. 2 W., 3½ miles downstream from Panther Creek. | 15.0 | 353 | 1945-56 | 50,410 | 1956 | 24,190 | 1947 |
| 0680 | Tahuya River near Tahuya | SW¼ sec. 12, T. 22 N., R. 3 W., 2½ miles upstream from mouth. | 42.2 | 60 | 1947 | - | - | - | - |
| 0685 | Dewatto Creek near Dewatto | Sec. 23, T. 23 N., R. 3 W., at county road bridge, 1½ miles upstream from mouth. | 18.4 | 55 | 1947-54, 1958- | 58,330 | 1950 | 27,600 | 1951 |
| 0690 | Anderson Creek near Holley | S½ sec. 17, T. 24 N., R. 2 W., half a mile upstream from mouth. | 5.17 | 20 | 1947 | - | - | - | - |
| 0695 | Stavis Creek near Seabeck | SW¼ sec. 25, T. 25 N., R. 2 W., three-quarters of a mile upstream from mouth. | 5.87 | 15 | 1947 | - | - | - | - |
| 0700 | Dogfish Creek near Poulsbo | SW¼ sec. 11, T. 26 N., R. 1 E., half a mile upstream from mouth. | 5.01 | 20 | 1947 | 8,960 | 1956 | 5,030 | 1955 |
| 0705 | Clear Creek near Silverdale | At north line sec. 16, T. 25 N., R. 1 E., 75 ft downstream from highway crossing, 1 mile upstream from mouth. | 7.46 | 30 | 1947 | - | - | - | - |
| 0720 | Chico Creek near Bremerton | At north line sec. 8, T. 24 N., R. 1 E., half a mile downstream from Dickerson Creek. | 15.3 | 50 | 1947-50 | - | - | - | - |
| 0725 | Blackjack Creek at Port Orchard | SE¼ sec. 26, T. 24 N., R. 1 E., a third of a mile upstream from mouth. | 12.3 | 30 | 1947-50 | - | - | - | - |
| 0730 | Burley Creek at Burley | NE¼ sec. 11, T. 22 N., R. 1 E., at county road bridge a quarter of a mile upstream from mouth. | 10.7 | 10 | 1947-50 | - | - | - | - |
| 0735 | Huge Creek near Wauna | At north line sec. 20, T. 22 N., R. 1 E., an eighth of a mile upstream from mouth. | 6.47 | 100 | 1947 | 12,550 | 1956 | 5,770 | 1952 |

| tember 30) | Seasonal discharge (July to September) | | | | | Extremes of Discharge | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mean | Maximum | | Minimum | | Mean | Maximum (cfs) | Date | Minimum (cfs) | Date |
| Acre-feet | Acre-feet | Year | Acre-feet | Year | Acre-feet | | | | |
| 8,840 (14 years) | 2,520 | 1957 | 105 | 1951 | 602 (14 seasons) | 476 | Feb. 22, 1949 | 0.2 | June 2, 1955 |
| 39,620 (12 years) | 4,430 | 1951 | 3,090 | 1952 | 5,730 (13 seasons) | 1,610 | Feb. 22, 1949 | 11 | Aug. 15, 1959 |
| 4,800 (8 years) | 99 | 1948 | 0 | 1951 | 25.4 (9 seasons) | 96 | Feb. 22, 1949 | 0 | Many times |
| 8,970 (7 years) | 126 | 1948 | 44 | 1947 | 79.2 (7 seasons) | 403 | Feb. 22, 1949 | 0 | Sept. 16, 21, 22, Oct. 1, 1951 |
| 4,370 (15 years) | 206 | 1948 | 88 | 1952 | 143 (15 seasons) | 203 | Feb. 22, 1949 | 0.1 | July 29, Sept. 9, 1958 |
| 16,170 (11 years) | 399 | 1955 | 73 | 1950 | 209 (12 seasons) | 504 | Nov. 3, 1955 | 0.1 | Sept. 22-26, 1947, Sept. 1-10, 12, 13, 1949, Oct. 4-10, 1952 |
| 2,170 (8 years) | 21.4 | 1946 | 0 | 1945-1953 | 3.56 (9 seasons) | 88 | Feb. 22, 1949 | 0 | Many times |
| 35,090 (11 years) | 261 | 1948 | 4.8 | 1951 | 115 (12 seasons) | 1,210 | Nov. 3, 1955 | 0 | Many times |
| - | - | - | - | - | 1,770 (1 season) | - | - | 6.9 | Sept. 2,3, 1947 |
| 47,140 (9 years) | 3,690 | 1948 | 2,570 | 1947 | 2,940 (11 seasons) | 2,110 | Nov. 3, 1955 | 9.6 | Sept. 22, 1950 |
| - | - | - | - | - | 1,000 (1 season) | - | - | 4.8 | July 29-31, Aug. 4, 1947 |
| - | - | - | - | - | 1,300 (1 season) | - | - | 6.3 | July 20, 21, 29, 30, 1947 |
| 6,480 (13 years) | 807 | 1960 | 491 | 1947 | 661 (14 seasons) | 333 | Feb. 22, 1949 | 0.7 | Aug. 6, 1959 |
| - | - | - | - | - | 460 (1 season) | - | - | 1.5 | July 30, 1947 |
| - | 908 | 1948 | 224 | 1947 | 464 (4 seasons) | - | - | 0 | Aug. 31 to Sept. 6, 1947 |
| - | 1,940 | 1950 | 1,410 | 1947 | 1,710 (4 seasons) | - | - | 6.7 | July 25, Sept. 2, 3, 1947 |
| - | 3,100 | 1948 | 2,570 | 1947 | 2,890 (4 seasons) | - | - | 11 | July 19-21, 1947 |
| 8,550 (13 years) | 1,030 | 1957 | 783 | 1947 | 890 (14 seasons) | 391 | Feb. 9, 1951 | 3.2 | Sept. 1, 1950 |

flow with respect to time. The three forms of presentation are discussed briefly below and are followed by the graphical and tabular expressions of the data.

### MAXIMUM-MINIMUM DAILY DISCHARGE

The hydrographs of maximum and minimum daily discharge shown on pages 70 through 90 are based on the maximum and minimum daily discharge for each day of the year throughout the period of record. The extremes of discharge thus plotted delineate a band within the boundaries of which every past daily discharge of record would lie if plotted. The hydrographs can be used to appraise the extremes of discharge to be expected throughout the year but do not define a record of continuous flow or typify the actual record for any individual year. The hydrographs approach the category of flow-duration graphs inasmuch as the minimum daily discharge hydrograph presents daily mean discharge that has been equaled or exceeded 100 percent of the time, while the maximum daily discharge hydrograph presents daily mean discharge that has not been exceeded at any time during the period of record. The discharge figures used for preparing these hydrographs are tabulated on pages 92 - 102.

### MAXIMUM, MINIMUM, AND AVERAGE MONTHLY DISCHARGE

The bar graphs shown on pages 70 - 90 and based on data listed on pages 103 - 108 are similar to the maximum-minimum daily discharge hydrographs in that they show, for each month, the maximum monthly discharge, the minimum monthly discharge, and the average of all the monthly discharges of record. These graphs appraise a stream's potential in more summarized form than do the daily maximum and minimum data.

### FLOW-DURATION CURVES

Flow-duration curves show the percentage of time that specified discharges were equaled or exceeded during a given period (Searcey, 1959). Such curves are used to analyze the availability and variability of streamflow and to investigate problems of water supply, power development, waste disposal, and administration of water rights. A flow-duration curve for the entire period of record in itself does not show a chronological sequence of flow, but the curves for each month of the year as shown on pages 71 through 91 provide a substitute for the chronologic sequence of events. Such curves tend to define the frequency of occurrence of discharge at any given time of the year. The flow-duration data are shown also in tabular form on pages 103 - 108.

## EVALUATION OF THE SURFACE-WATER SUPPLY

### SURFACE-WATER MAP

All surface-water sources included in this study are shown on the surface-water map (pl. 3). Names of lakes and streams are indicated when known, but the majority of smaller streams in the report area are unnamed. Numbers were therefore assigned to each individual stream system terminating at salt water to avoid confusion in identification. Many small seeps and springs issue from aquifers which crop out in various areas along the shore; however, these were generally omitted from the map and numbering system unless they discharged into well-defined drainage courses.

The stream numbers appear in red near the mouth of each stream and run consecutively in a clockwise direction around the periphery of the Kitsap Peninsula starting near the terminus of Hood Canal and ending at North Bay. The numbering system is continued in a like manner for each island beginning at the north end of Bainbridge Island and ending near the north end of Anderson Island. A study of available maps combined with a thorough field investigation indicated there are a total of 582 separate identifiable stream systems within the area under study. Of these, 426 are located on the Kitsap Peninsula proper, 38 on Bainbridge Island, 83 on Vashon and Maury Islands, 8 on Fox Island, 4 on McNeil Island and 23 on Anderson Island. As a consequence of their small size, no well established stream systems occur on the other islands included in the report.

Within each separate drainage basin terminating in salt water another system of numbering is used to identify tributary streams and their sub-basins. In this system each tributary confluence with the main stem or with another tributary is assigned a number which appears in blue on the map. Beginning with zero at the mouth, each primary tributary confluence with the main stream is numbered consecutively in an upstream direction. Using the primary confluence number as a base, a similar consecutive numbering system is then applied to the branches of each primary tributary to indicate secondary points of confluence and so on until every confluence point is numbered. In all cases each additional number is separated from the other base numbers by a colon. To alleviate congestion, confluence numbers of zero are omitted from the map, since in all cases, they simply refer to the mouth of the stream.

The surface-water map also shows the locations and numbers of all streamflow gaging stations, miscellaneous flow measurement points and surface-water quality stations listed in tables 10, 11 and 56.

### REPORT AREA YIELD

In the Kitsap Peninsular region continuous-record stream gaging started in 1945 primarily as the result of increased concern by the City of Bremerton to find an adequate municipal water supply. Of the 18 stations installed in this area during the 3-year period, 1945-47, only 4 were still in operation as of 1960 and 7 have less than 5 years of record. Since no data were collected before this time, it seemed justifiable to limit the surface-water analysis to the 15-year period 1946-60.

When the water resource inventory program was initiated, however, the years 1908-33 and 1934-59 were established as common periods for analyzing data in all reports (p. 8 - 9). At that time a preliminary study of precipitation and streamflow records indicated that over most of Washington similar average climatic trends seemed to repeat during these 26-year periods. This investigation also showed a general deficiency of data, especially streamflow records, prior to 1930. Therefore, of the 2 periods, the years 1934-59 were most suitable for use in all analyses.

To comply with this previously established criteria, in the surface-water analysis it was necessary to extrapolate data obtained during the 15-year period to obtain information representative of the 26-year periods. This was accomplished through use of annual runoff ratios.

Table 11. MISCELLANEOUS LOW FLOW DISCHARGE MEASUREMENTS.

| Map No. | Stream | Location | Drain. area (sq mi) | Publication (WSP) | Minimum discharge measured | |
|---|---|---|---|---|---|---|
| | | | | | Cfs | Date |
| | KITSAP PENINSULA | | | | | |
| KP1 | Unnamed stream (tributary to Union River) | SW¼NE¼ sec. 34, T. 24 N., R. 1 W., at mouth, 250 ft below gaging station on Union River and 7 miles west of Bremerton. | 1.23 | 1246 | 1.26 | Jan. 10, 1952 |
| KP2 | Union River | SW¼ sec. 3, T. 23 N., R. 1 W., at crossing of Old Navy Yard Highway, 5 miles northeast of Belfair. | 6.96 | 962, 982, 1092, 1566, 1636 | 1.13 | Sept. 29, 1943 |
| KP3 | Bear Creek | SE¼ sec. 9, T. 23 N., R. 1 W., at crossing of Old Navy Yard Highway 3 miles north of Belfair. | 1.40 | 1092, 1122, 1566, 1636 | 0.61 | Sept. 19, 1947 |
| KP4 | Unnamed stream (tributary to Union River) | About east line sec. 17, T. 23 N., R. 1 W., at crossing of Old Navy Yard Highway, 2 miles north of Belfair. | 0.39 | 1092, 1566, 1636 | 0 | Aug. 14, 1958<br>Aug. 19, 1959 |
| KP5 | Courtney Creek | NW¼NE¼ sec. 20, T. 23 N., R. 1 W., at crossing of Old Navy Yard Highway, 1½ miles north of Belfair. | 1.48 | 1092, 1566, 1636 | 2.83 | Aug. 14, 1958 |
| KP6 | Unnamed stream (tributary to Union River) | NE¼ sec. 29, T. 23 N., R. 1 W., at crossing of Old Navy Yard Highway, ½ mile north of Belfair. | 1.31 | 1092, 1566, 1636 | 0.83 | Aug. 14, 1958 |
| KP7 | Unnamed stream (tributary to Union River) | SE¼ sec. 29, T. 23 N., R. 1 W., at highway crossing at Belfair. | 0.53 | 1092, 1566, 1636 | 0.89 | Aug. 14, 1958 |
| KP8 | Unnamed stream (tributary to Union River) | SE¼SE¼ sec. 30, T. 23 N., R. 1 W., at road crossing, ¼ mile above mouth and 3/4 mile west of Belfair. | 0.20 | 1092, 1566, 1636 | 0 | Sept. 24, 1947 |
| KP9 | Mission Creek | NE¼ sec. 36, T. 23 N., R. 2 W., at road crossing, 3/4 mile above mouth and 2 miles west of Belfair. | 13.1 | 1092, 1122, 1566, 1636 | 5.63 | Aug. 25, 1947 |
| KP10 | Little Mission Creek | NW¼ sec. 1, T. 22 N., R. 2 W., at road crossing, ½ mile above mouth and 3 miles southwest of Belfair. | 1.51 | 1092, 1566, 1636 | 2.02 | Aug. 25, 1947 |
| KP11 | Johnson Creek (tributary to Hood Canal) | About center of sec. 2, T. 22 N., R. 2 W., at road crossing 500 ft above mouth and 3½ miles southwest of Belfair. | 0.66 | 1092, 1566, 1636 | 0.19 | Aug. 25, 1947 |
| KP12 | Stimson Creek | NW¼ sec. 11, T. 22 N., R. 2 W., at road crossing, 400 ft above mouth and 4½ miles southwest of Belfair. | 1.86 | 1092, 1566, 1636 | 0.82 | Aug. 15, 1958 |
| KP13 | Unnamed stream (tributary to Hood Canal) | SE¼ sec. 9, T. 22 N., R. 2 W., at road crossing, 400 ft above mouth and 6 miles southwest of Belfair. | 0.30 | 1092, 1566, 1636 | 0.10 | Aug. 26, 1947 |
| KP14 | Little Shoofly Creek | NW¼ sec. 17, T. 22 N., R. 2 W., at road crossing at mouth, 7½ miles southwest of Belfair. | 0.66 | 1092, 1566, 1636 | 0.66 | Aug. 26, 1947 |
| KP15 | Shoofly Creek | SW¼ sec. 18, T. 22 N., R. 2 W., at road crossing, 400 ft above mouth and 8½ miles southwest of Belfair. | 0.88 | 1092, 1566, 1636 | 0.02 | Aug. 24, 1959 |
| KP16 | Unnamed stream (tributary to Tahuya River) | W½ sec. 2, T. 23 N., R. 2 W., at road crossing, 3/4 mile above mouth and 5½ miles northwest of Belfair. | 2.03 | 1092, 1566 | 0 | Aug. 26, 1947<br>Aug. 15, 1958 |
| KP17 | Unnamed stream (tributary to Tahuya River) | Near center sec. 33, T. 23 N., R. 2 W., 200 ft below road crossing, 1 mile above mouth and 5 miles west of Belfair. | 4.19 | 1092, 1566 | 0 | Aug. 15, 1958 |

Table 11. MISCELLANEOUS LOW FLOW DISCHARGE MEASUREMENTS. (Continued)

| Map No. | Stream | Location | Drain. area (sq mi) | Publication (WSP) | Minimum discharge measured Cfs | Date |
|---|---|---|---|---|---|---|
| | KITSAP PENINSULA (continued) | | | | | |
| KP18 | Unnamed stream (tributary to Tahuya River) | SE¼ sec. 22, T. 22 N., R. 3 W., at road crossing, 400 ft above mouth and ½ mile northeast of Tahuya. | 1.20 | 1566 | 0 | Aug. 18, 1958 |
| KP19 | Caldervin Creek | NW¼ sec. 27, T. 22 N., R. 3 W., at road crossing, 400 ft above mouth at Tahuya. | 1.09 | 1092 | 1.34 | Aug. 26, 1947 |
| KP20 | Rendsland Creek | N½ sec. 19, T. 22 N., R. 3 W., at road crossing at mouth, 3 miles west of Tahuya. | 8.74 | 1092 | 0 | Aug. 26, 1947 |
| KP21 | Dewatto Creek | SE¼ sec. 32, T. 24 N., R. 2 W., at road crossing, 2½ miles south of Holley. | 3.01 | 1092, 1566 | 0.40 | Aug. 26, 1947 |
| KP22 | Ludvick Lake Creek | Near center sec. 6, T. 23 N., R. 2 W., at road crossing, ¼ mile above mouth and 3 miles south of Holley. | 1.01 | 1092, 1566 | 0 | Aug. 26, 1947<br>Aug. 19, 1958 |
| KP23 | Unnamed stream (tributary to Dewatto Creek) | North line sec. 7, T. 23 N., R. 2 W., at road crossing, 500 ft above mouth and 3½ miles south of Holley. | 0.72 | 1092, 1566 | 0.03 | Aug. 19, 1958 |
| KP24 | Unnamed stream (tributary to Dewatto Creek) | SE¼ sec. 27, T. 23 N., R. 3 W., at road crossing, 1¼ miles east of Dewatto. | 1.77 | 1092, 1122, 1566 | 1.27 | Sept. 18, 1947 |
| KP25 | Thomas Creek | NE¼ sec. 19, T. 24 N., R. 2 W., 200 ft above road crossing, 500 ft above mouth and ¼ mile northeast of Holley. | 0.37 | 1092, 1122, 1566 | 2.37 | Aug. 26, 1947 |
| KP25.1 | Harding Creek | NW¼SW¼ sec. 9, T. 24 N., R. 2 W., at mouth. | 1.37 | (a) | 4.85 | Sept. 15, 1961 |
| KP26 | Seabeck Creek | NW¼ sec. 29, T. 25 N., R. 1 W., at road crossing, ¼ mile above mouth at Seabeck. | 5.06 | 1092, 1566 | 0.27 | Aug. 19, 1958 |
| KP27 | Big Beef Creek | North line sec. 8, T. 24 N., R. 1 W., at road crossing, 3 miles south of Seabeck. | 5.69 | 1092, 1566 | 0.61 | Sept. 30, 1947 |
| KP28 | Big Beef Creek | North line NE¼ sec. 22, T. 25 N., R. 1 W., about ¼ mile above mouth and 2½ miles northeast of Seabeck. | 14.0 | 1092, 1566 | 3.91 | Aug. 20, 1958 |
| KP29 | Johnson Creek | NW¼ sec. 14, T. 25 N., R. 1 W., at road crossing near mouth, 3 miles northeast of Seabeck. | 0.66 | 1092, 1566 | 0.05 | Aug. 27, 1947 |
| KP30 | Anderson Creek | NW¼ sec. 13, T. 25 N., R. 1 W., at road crossing, ½ mile above mouth and 4 miles northeast of Seabeck. | 4.04 | 1092, 1566 | 2.07 | Sept. 18, 1947 |
| KP31 | Unnamed stream (tributary to Anderson Creek) | NE¼ sec. 14, T. 25 N., R. 1 W., at road crossing near mouth and 4 miles northeast of Seabeck. | 0.37 | 1092, 1566 | 0.19 | Aug. 27, 1947 |
| KP32 | South branch unnamed stream (tributary to Hood Canal) | W½ sec. 23, T. 27 N., R. 1 E., at road crossing, 600 ft above north branch and 3½ miles southwest of Port Gamble. | 1.97 | 1092, 1566 | 0.01 | Aug. 25, 1947 |
| KP33 | North branch unnamed stream (tributary to Hood Canal) | W½ sec. 23, T. 27 N., R. 1 E., at road crossing, 400 ft above south branch and 3½ miles southwest of Port Gamble. | 0.86 | 1092, 1566 | 0.08 | Aug. 25, 1947 |
| KP34 | Unnamed stream (tributary to Hood Canal) | NW¼ sec. 13, T. 27 N., R. 1 E., at road crossing, ¼ mile above mouth and 2¼ miles southwest of Port Gamble. | 0.59 | 1092, 1566 | 0.82 | Aug. 25, 1947 |

(a) Surface Water Records of Washington, 1961.

Table 11. MISCELLANEOUS LOW FLOW DISCHARGE MEASUREMENTS. (Continued)

| Map No. | Stream | Location | Drain. area (sq mi) | Publication (WSP) | Minimum discharge measured | |
|---|---|---|---|---|---|---|
| | | | | | Cfs | Date |
| | KITSAP PENINSULA (continued) | | | | | |
| KP35 | Gamble Creek | SW¼ SW¼ sec. 29, T. 27 N., R. 2 E., at road crossing, 1½ miles above mouth and 4 miles south of Port Gamble. | 4.87 | 1092, 1566 | 0.45 | Aug. 25, 1947 |
| KP36 | Unnamed stream (tributary to Gamble Creek) | SW¼ sec. 20, T. 27 N., R. 2 E., at road crossing, 900 ft above mouth and 2½ miles south of Port Gamble. | 0.86 | 1092, 1566 | 0.10 | Aug. 26, 1958 |
| KP37 | Buck Lake Outlet | SW¼ sec. 16, T. 28 N., R. 2 E., at road crossing, 600 ft above mouth and ½ mile west of Hansville. | 0.33 | 1092, 1566 | 0 | Aug. 5, 1947 |
| KP38 | Silver (Eglon) Creek | NW¼ sec. 2, T. 27 N., R. 2 E., at road crossing at Eglon, 300 ft above mouth. | 2.24 | 1092, 1566 | 0.03 | Aug. 26, 1958 |
| KP39 | Unnamed stream (tributary to Puget Sound) | NW¼ sec. 11, T. 27 N., R. 2 E., at road crossing, ¼ mile above mouth and 3/4 mile south of Eglon. | 0.95 | 1092, 1566 | 0.04 | Aug. 26, 1958 |
| KP40 | Carpenter Lake Outlet | SW¼ sec. 26, T. 27 N., R. 2 E., at road crossing, ½ mile above mouth and 3/4 mile west of Kingston. | 2.35 | 1092, 1566 | 0 | Aug. 26, 1947<br>Aug. 27, 1958 |
| KP41 | Grovers Creek | NW¼ sec. 4, T. 26 N., R. 2 E., at road crossing, ½ mile above mouth and 2½ miles northwest of Kitsap. | 6.45 | 1092, 1566 | 0.33 | Aug. 5, 1947 |
| KP42 | Unnamed stream (tributary to Miller Bay) | NW¼ sec. 16, T. 26 N., R. 2 E., at road crossing, 400 ft above mouth and 1½ miles west of Kitsap. | 0.62 | 1092, 1566 | 0.06 | Aug. 26, 1947 |
| KP43 | Thompson Creek | S½ sec. 29, T. 26 N., R. 2 E., at road crossing, 600 ft above mouth and 2 miles east of Keyport. | 2.35 | 1092, 1566 | 0.05 | Aug. 26, 1947 |
| KP44 | Unnamed stream (tributary to Puget Sound) | Northwest corner sec. 31, T. 26 N., R. 2 E., at road crossing, 1,000 ft above mouth and 3/4 mile northeast of Keyport. | 1.79 | 1092, 1566 | 0 | Aug. 26, 1947<br>Aug. 27, 1958 |
| KP45 | Unnamed stream (tributary to Puget Sound) | SE¼ sec. 25, T. 26 N., R. 1 E., at road crossing, 600 ft above mouth and 3/4 mile north of Keyport. | 1.44 | 1092, 1566 | 0.01 | Aug. 27, 1958 |
| KP46 | West Fork Dogfish Creek | S½ sec. 11, T. 26 N., R. 1 E., at road crossing, 100 ft above East Fork and 1½ miles north of Poulsbo. | 2.76 | 1092, 1566 | 1.62 | Aug. 26, 1958 |
| KP47 | Unnamed stream (tributary to Dogfish Creek) | NW¼ sec. 14, T. 26 N., R. 1 E., at road crossing, 1 mile north of Poulsbo. | 1.15 | 1092, 1566 | 0.18 | Aug. 26, 1958 |
| KP48 | Johnson Creek | NW¼ sec. 22, T. 26 N., R. 1 E., at highway crossing, 800 ft above mouth and 1 mile west of Poulsbo. | 3.28 | 1092, 1566 | 0.68 | Aug. 26, 1947 |
| KP49 | Jacques Creek | SE¼ sec. 27, T. 26 N., R. 1 E., at road crossing ½ mile above mouth and 1 mile northwest of Keyport. | 0.41 | 1092, 1566 | 0.08 | Aug. 26, 1947 |
| KP50 | Unnamed stream (tributary to Liberty Bay) | SW¼ sec. 35, T. 26 N., R. 1 E., at road crossing, 600 ft above mouth and 3/4 mile west of Keyport. | 0.36 | 1092, 1566 | 0 | Aug. 25, 1958 |
| KP51 | Unnamed stream (tributary to Liberty Bay) | SE¼ sec. 35, T. 26 N., R. 1 E., at road crossing, 600 ft above mouth and ½ mile west of Keyport. | 0.08 | 1092, 1566 | 0.05 | Aug. 25, 1958 |

Table 11. MISCELLANEOUS LOW FLOW DISCHARGE MEASUREMENTS. (Continued)

| Map No. | Stream | Location | Drain. area (sq mi) | Publication (WSP) | Minimum discharge measured | |
|---|---|---|---|---|---|---|
| | | | | | Cfs | Date |
| | KITSAP PENINSULA (continued) | | | | | |
| KP52 | Steel Creek | SE¼ sec. 14, T. 25 N., R. 1 E., 200 ft above road crossing and mouth, ½ mile west of Brownsville. | 4.75 | 1092, 1566 | 0.89 | Aug. 26, 1947 |
| KP53 | Illahee Creek | S½ sec. 31, T. 25 N., R. 2 E., at mouth, 2½ miles northeast of Bremerton. | 1.28 | 1092, 1566 | 0.41 | Aug. 27, 1947 |
| KP54 | Unnamed stream (tributary to Port Orchard) | SW¼ sec. 7, T. 24 N., R. 2 E., at road crossing, 1,000 ft above mouth and 1 mile east of Bremerton. | 0.70 | 1092, 1566 | 0.26 | Aug. 27, 1947 |
| KP55 | Unnamed stream (tributary to Dyes Inlet) | NE¼NE¼ sec. 3, T. 24 N., R. 1 E., at road crossing, ¼ mile above mouth and ¼ mile south of Tracyton. | 0.21 | 1092, 1566 | 0.05 | Aug. 22, 1958 |
| KP56 | Mosher Creek | SE¼ sec. 34, T. 25 N., R. 1 E., at road crossing, 1/8 mile north of Tracyton and ¼ mile above mouth. | 1.58 | 1092, 1566 | 0.28 | Aug. 26, 1947 |
| KP57 | Unnamed stream (tributary to Dyes Inlet) | NE¼ sec. 34, T. 25 N., R. 1 E., at road crossing, 600 ft above mouth and ½ mile north of Tracyton. | 0.42 | 1092, 1566 | 0 | Aug. 26, 1947<br>Aug. 22, 1958 |
| KP58 | Unnamed stream (tributary to Dyes Inlet) | NW¼ sec. 34, T. 25 N., R. 1 E., at road crossing, ¾ mile above mouth and 1 mile northwest of Tracyton. | 0.27 | 1092, 1566 | 0 | Aug. 26, 1947 |
| KP59 | Barker Creek | SW¼ sec. 22, T. 25 N., R. 1 E., at road crossing, 3/8 mile above mouth and 1½ miles east of Silverdale. | 4.02 | 1092, 1566 | 1.81 | Aug. 26, 1947 |
| KP60 | West Fork Clear Creek | About south line sec. 9, T. 25 N., R. 1 E., at mouth, just above highway crossing Clear Creek, 1¼ miles north of Silverdale. | 3.68 | 1092, 1566 | 2.16 | Aug. 27, 1947 |
| KP61 | Unnamed stream (tributary to Dyes Inlet) | SW¼SW¼ sec. 16, T. 25 N., R. 1 E., at highway crossing, ¼ mile above mouth and ½ mile north of Silverdale. | 0.44 | 1092, 1566 | 0.06 | Aug. 27, 1947 |
| KP62 | Strawberry Creek | NE¼ sec. 20, T. 25 N., R. 1 E., at highway crossing at Silverdale, ¼ mile above mouth. | 3.01 | 1092, 1566 | 1.08 | Aug. 27, 1947 |
| KP63 | Knapp Creek | E½ sec. 20, T. 25 N., R. 1 E., at highway crossing near mouth, 3/8 mile south of Silverdale. | 0.28 | 1092, 1566 | 0 | Aug. 21, 1958 |
| KP64 | Unnamed stream (tributary to Dyes Inlet) | SE¼ sec. 20, T. 25 N., R. 1 E., at highway crossing near mouth, ½ mile south of Silverdale. | 0.55 | 1092, 1566 | 0.03 | Aug. 21, 1958 |
| KP65 | Woods Creek | SW¼ sec. 29, T. 25 N., R. 1 E., at highway crossing near mouth, 1¼ miles south of Silverdale. | 0.40 | 1092, 1566 | 0.20 | Aug. 22, 1958 |
| KP66 | Unnamed stream (tributary to Dyes Inlet) | NW¼ sec. 32, T. 25 N., R. 1 E., at highway crossing, 800 ft above mouth and 1 3/4 miles south of Silverdale. | 0.17 | 1092, 1566 | 0.08 | Sept. 25, 1947 |
| KP67 | Unnamed stream (tributary to Dyes Inlet) | About center W½ sec. 32, T. 25 N., R. 1 E., at highway crossing near mouth, 2 miles south of Silverdale. | 0.05 | 1092, 1566 | 0.08 | Sept. 25, 1947 |
| KP68 | Unnamed stream (tributary to Dyes Inlet) | SW¼ sec. 32, T. 25 N., R. 1 E., at highway crossing near mouth, 2½ miles south of Silverdale. | 0.23 | 1092, 1566 | 0.06 | Aug. 22, 1958 |
| KP69 | Unnamed stream (tributary to Dyes Inlet) | NW¼ sec. 5, T. 24 N., R. 1 E., at highway crossing near mouth, 2 3/4 miles south of Silverdale. | 0.13 | 1092, 1566 | 0.23 | Aug. 27, 1947 |

Table 11. MISCELLANEOUS LOW FLOW DISCHARGE MEASUREMENTS. (Continued)

| Map No. | Stream | Location | Drain. area (sq mi) | Publication (WSP) | Minimum discharge measured | |
|---|---|---|---|---|---|---|
| | | | | | Cfs | Date |
| | KITSAP PENINSULA (continued) | | | | | |
| KP70 | Wildcat Creek | E½ sec. 2, T. 24 N., R. 1 W., at lake outlet, 5 miles west of Bremerton. | 2.50 | 1092, 1122, 1152, 1182, 1216, 1566 | 0 | Sept. 17, 30, 1947 Sept. 14, 1949 |
| KP70.1 | Wildcat Creek | SW¼NW¼ sec. 7, T. 24 N., R. 1 E., 500 ft above Lost Creek. | 6.20 | (a) | 0.14 | Sept. 8, 1961 |
| KP70.2 | Lost Creek | SW¼NW¼ sec. 7, T. 24 N., R. 1 E., 500 ft above mouth. | 3.08 | (a) | 0.73 | Sept. 8, 1961 |
| KP71 | Dickenson Creek | SW¼NW¼ sec. 8, T. 24 N., R. 1 E., at lane crossing at mouth, 3 miles west of Bremerton. | 2.19 | 1092, 1566 | 0.04 | Aug. 5, 27, 1947 |
| KP72 | Kitsap Creek | SW¼ sec. 8, T. 24 N., R. 1 E., at lake outlet 2 miles west of Bremerton. | 2.73 | 1092, 1122, 1152, 1182, 1216, 1566 | 0.08 | Aug. 21, 1958 |
| KP73 | Gorst Creek | NW¼ sec. 32, T. 24 N., R. 1 E., 150 ft above Heins Creek, 3/4 mile above mouth and 3½ miles southwest of Bremerton. | 4.35 | 1092, 1566 | 7.68 | Aug. 28, 1947 |
| KP74 | Heins Creek | About west line sec. 32, T. 24 N., R. 1 E., 200 ft above mouth and 3½ miles southwest of Bremerton. | 1.63 | 1092, 1566 | 0.62 | Aug. 19, 1958 |
| KP75 | Parish Creek | W½ sec. 32, T. 24 N., R. 1 E., at highway crossing, 150 ft above diversion point and 3 miles southeast of Bremerton. | 1.66 | 1092, 1566 | 0.81 | Aug. 28, 1947 |
| KP76 | Unnamed stream (tributary to Blackjack Creek) | West line NW¼ sec. 23, T. 23 N., R. 1 E., at road crossing, 0.2 mile above mouth and 4 miles south of Port Orchard. | 1.41 | 1092, 1566 | 3.61 | Aug. 19, 1958 |
| KP77 | Blackjack Creek | NW¼ sec. 1?, T. 23 N., R. 1 E., at road crossing, 2 miles south of Port Orchard and 3 miles above mouth. | 10.5 | 1092, 1566 | 4.75 | Aug. 28, 1947 |
| KP78 | Annapolis Creek | NE¼ sec. 25, T. 24 N., R. 1 E., at road crossing at mouth, 3/4 mile east of Port Orchard. | 1.86 | 1092, 1566 | 0.40 | Aug. 27, 1947 |
| KP79 | Unnamed stream (tributary to Port Orchard) | NW¼ sec. 30, T. 24 N., R. 2 E., 300 ft above road crossing, 400 ft above mouth and 1 mile east of Port Orchard. | 0.20 | 1092, 1566 | 0.40 | Aug. 21, 1958 |
| KP80 | Unnamed stream (tributary to Port Orchard) | NW¼ sec. 30, T. 24 N., R. 2 E. at highway crossing 1 mile east of Port Orchard. | 0.07 | 1566 | 0.17 | Aug. 21, 1958 |
| KP81 | Sullivan Creek | SW¼ sec. 19, T. 24 N., R. 2 E., 300 ft above road crossing, 400 ft above mouth and 1½ miles northeast of Port Orchard. | 1.00 | 1092, 1566 | 0.36 | Aug. 21, 1958 |
| KP82 | Unnamed stream (tributary to Port Orchard) | NE¼ sec. 19, T. 24 N., R. 2 E., at road crossing at mouth and 2 miles northeast of Port Orchard. | 0.25 | 1092, 1566 | 0.02 | Aug. 21, 1958 |
| KP83 | Unnamed stream (tributary to Port Orchard) | NE¼ sec. 17, T. 24 N., R. 2 E., at road crossing at mouth, 3½ miles northeast of Port Orchard. | 0.32 | 1092, 1566 | 0 | Aug. 27, 1947 Aug. 21, 1958 |
| KP84 | Unnamed stream (tributary to Port Orchard) | South line sec. 8, T. 24 N., R. 2 E., at road crossing, 3/8 mile above mouth and 4 miles northeast of Port Orchard. | 0.40 | 1092, 1566 | 0.06 | Aug. 27, 1947 |
| KP85 | Beaver Creek | W½ sec. 16, T. 24 N., R. 2 E., at road crossing, ¼ mile above mouth and 3 miles east of Bremerton | 1.61 | 1092, 1566 | 0.44 | Aug. 27, 1947 |

(a) Surface Water Records of Washington, 1961.

Table 11. MISCELLANEOUS LOW FLOW DISCHARGE MEASUREMENTS. (Continued)

| Map No. | Stream | Location | Drain. area (sq mi) | Publication (WSP) | Minimum discharge measured Cfs | Date |
|---|---|---|---|---|---|---|
| | KITSAP PENINSULA (continued) | | | | | |
| KP86 | Duncan Creek | SW¼ sec. 22, T. 24 N., R. 2 E., at road crossing, at Manchester, 500 feet above mouth. | 0.45 | 1092, 1566 | 0.04 | Aug. 27, 1947 |
| KP87 | Salmonberry Creek | South Line sec. 7, T. 23 N., R. 2 E., at road crossing, ½ mile above mouth and 3½ miles southeast of Port Orchard. | 4.99 | 1092, 1566 | 1.29 | Aug. 21, 1958 |
| KP88 | Curley Creek | NE¼NE¼ sec. 8, T. 23 N., R. 2 E., 1 mile below Long Lake outlet and 4 miles southeast of Port Orchard. | 11.6 | 1092, 1216, 1566 | 3.13 | July 28, 1958 |
| KP89 | Unnamed stream (tributary to Yukon Harbor) | SW¼SW¼ sec. 34, T. 24 N., R. 2 E., at road crossing near mouth, 1 mile west of Harper. | 0.21 | 1092, 1566 | 0.03 | Aug. 28, 1947 |
| KP90 | Unnamed stream (tributary to Yukon Harbor) | SE¼SW¼ sec. 34, T. 24 N., R. 2 E., at road crossing near mouth, 3/4 mile west of Harper. | 0.05 | 1092, 1566 | 0 | Aug. 28, 1947<br>Aug. 21, 1958 |
| KP91 | Wilson Creek (tributary to Yukon Harbor) | S½ sec. 34, T. 24 N., R. 2 E., at road crossing at mouth, 5/8 mile west of Harper. | 0.96 | 1092, 1566 | 0 | Aug. 28, 1947 |
| KP92 | Unnamed stream (tributary to Yukon Harbor) | SW¼SE¼ sec. 34, T. 24 N., R. 2 E., at road crossing at mouth, ½ mile west of Harper. | 0.42 | 1092, 1566 | 0 | Aug. 28, 1947 |
| KP93 | Unnamed stream (tributary to Puget Sound) | NW¼ sec. 2, T. 23 N., R. 2 E., at road crossing at mouth, 3/8 mile south of Harper. | 0.43 | 1092, 1566 | 0 | Aug. 21, 1958 |
| KP94 | Olalla Creek | North line sec. 5, T. 22 N., R. 2 E., at road crossing, 1½ miles above mouth and 2 miles west of Olalla. | 3.88 | 1092, 1566 | 3.03 | July 28, 1958 |
| KP95 | Crescent Creek | N½ sec. 32, T. 22 N., R. 2 E., at road crossing, 1 mile above mouth and 1½ miles north of Gig Harbor. | 4.64 | 1092, 1566 | 1.27 | July 31, 1947 |
| KP96 | Sullivan Creek | SW¼NW¼ sec. 29, T. 21 N., R. 2 E., at road crossing near mouth and 3½ miles south of Gig Harbor. | 1.61 | 1092, 1566 | 0.04 | Aug. 29, 1947 |
| KP97 | Unnamed stream (tributary to Wollochet Bay) | SW¼ sec. 19, T. 21 N., R. 2 E., at road crossing at mouth, 3 miles south of Gig Harbor. | 1.87 | 1092, 1566 | 0.01 | Aug. 29, 1947 |
| KP98 | Unnamed stream (tributary to Wollochet Bay) | NE¼NE¼ sec. 24, T. 21 N., R. 1 E., at road crossing, 500 ft above mouth and 2½ miles southwest of Gig Harbor. | 2.52 | 1092, 1566 | 0.01 | Aug. 29, 1947 |
| KP99 | Artondale Creek | NE¼ sec. 24, T. 21 N., R. 1 E., at road crossing near mouth, 2½ miles southwest of Gig Harbor. | 2.99 | 1092, 1566 | 0.76 | Aug. 20, 1958 |
| KP100 | Unnamed stream (tributary to Hale Passage) | SW¼ sec. 25, T. 21 N., R. 1 E., at road crossing at mouth, 4 miles southwest of Gig Harbor. | 0.10 | 1092, 1566 | 0 | Aug. 29, 1947<br>Aug. 20, 1958 |
| KP101 | Unnamed stream (tributary to Hale Passage) | NE¼ sec. 26, T. 21 N., R. 1 E., at road crossing at mouth, 4 miles southwest of Gig Harbor. | 0.19 | 1092, 1566 | 0.03 | Aug. 20, 1958 |
| KP102 | Warren Creek | SE¼ sec. 22, T. 21 N., R. 1 E., at road crossing near mouth, 4½ miles southwest of Gig Harbor. | 0.83 | 1092, 1566 | 0.06 | Aug. 20, 1958<br>Aug. 29, 1947 |

Table 11. MISCELLANEOUS LOW FLOW DISCHARGE MEASUREMENTS. (Continued)

| Map No. | Stream | Location | Drain. area (sq mi) | Publication (WSP) | Minimum discharge measured | |
|---|---|---|---|---|---|---|
| | | | | | Cfs | Date |
| | KITSAP PENINSULA (continued) | | | | | |
| KP103 | Unnamed stream (tributary to Henderson Bay) | SE¼ sec. 9, T. 21 N., R. 1 E., at road crossing at mouth, 1½ miles southwest of Rosedale. | 0.14 | 1092, 1566 | 0.06 | Aug. 20, 1958 |
| KP104 | Unnamed stream (tributary to Henderson Bay) | SE¼ sec. 10, T. 21 N., R. 1 E., 200 ft above road crossing, ¼ mile from mouth and 3/4 mile south of Rosedale. | 2.03 | 1092, 1566 | 0.64 | Aug. 20, 1958 |
| KP105 | Meyer Creek | SW¼SW¼ sec. 2, T. 21 N., R. 1 E., at road crossing at mouth, at Rosedale. | 0.71 | 1092, 1566 | 0.96 | Aug. 20, 1958 |
| KP106 | Unnamed stream (tributary to Henderson Bay) | SE¼NW¼ sec. 2, T. 21 N., R. 1 E., at road crossing 3/4 mile above mouth and 3/4 mile north of Rosedale. | 0.52 | 1092, 1566 | 0.02 | Aug. 29, 1947 |
| KP107 | McCormick Creek | NW¼ sec. 25, T. 22 N., R. 1 E., at road crossing 500 ft above mouth and 1 mile south of Purdy. | 2.36 | 1092, 1566 | 0.93 | Aug. 29, 1947 |
| KP108 | Unnamed stream (tributary to Henderson Bay) | W½ sec. 24, T. 22 N., R. 1 E., at road crossing 800 ft above mouth and ¼ mile south of Purdy. | 1.55 | 1092, 1566 | 0.02 | Aug. 21, 1958 |
| KP109 | Purdy Creek | SW¼ sec. 13, T. 22 N., R. 1 E., at road crossing near mouth, ¼ mile north of Purdy. | 3.44 | 1092, 1566 | 1.44 | Aug. 28, 1947 |
| KP110 | Unnamed stream (tributary to Burley Creek) | About center of sec. 1, T. 22 N., R. 1 E., at road crossing ½ mile above mouth and 3/4 mile north of Burley. | 0.52 | 1092, 1566 | 0.05 | Aug. 18, 1958 |
| KP111 | Bear Creek (tributary to Burley Creek) | East line SE¼ sec. 2, T. 22 N., R. 1 E., 300 ft above mouth at Burley. | 1.99 | 1092, 1566 | 2.25 | Sept. 26, 1947 |
| KP112 | Unnamed stream (tributary to Burley Creek) | NE¼NE¼ sec. 11, T. 22 N., R. 1 E., at mouth at Burley. | 0.51 | 1092, 1566 | 0.16 | Aug. 26, 1947 |
| KP113 | Minter Creek | Southwest corner sec. 16, T. 22 N., R. 1 E., above road crossing, ¼ mile above Huge Creek and 2¼ miles west of Wauna. | 5.67 | 1092, 1122, 1286, 1566 | 5.30 | July 17, 1958 |
| KP114 | South Fork Minter Creek | About center west line sec. 21, T. 22 N., R. 1 E., at road crossing, ¼ mile above mouth and 2 miles west of Wauna. | 2.34 | 1092, 1566 | 0 | Aug. 29, 1947<br>Aug. 11, 1958 |
| KP115 | Lackey Creek | SW¼ sec. 30, T. 22 N., R. 1 E., at highway crossing, 1 mile above mouth and 4 miles southwest of Wauna. | 1.78 | 1092, 1566 | 0 | Aug. 29, 1947<br>Aug. 11, 1958 |
| KP116 | Unnamed stream (tributary to Carr Inlet) | NW¼ sec. 35, T. 21 N., R. 1 W., at road crossing at Home, ¼ mile above mouth. Note--Enters Von Geldern Cove from north. | 1.22 | 1092, 1566 | 0.21 | Aug. 29, 1947 |
| KP117 | Unnamed stream (tributary to Carr Inlet) | NW¼ sec. 35, T. 21 N., R. 1 W., at Home, ¼ mile above mouth. Stream enters Von Geldern Cove from west. | 2.60 | 1092, 1566 | 0 | Aug. 13, 1958 |
| KP118 | Dutcher Creek | S½ sec. 11, T. 21 N., R. 1 W., 100 ft below highway crossing, ½ mile above mouth and 2½ miles north of Home. | 2.25 | 1092, 1566 | 0.13 | Aug. 11, 1958 |
| KP119 | Unnamed stream (tributary to Case Inlet) | SW¼SW¼ sec. 36, T. 22 N., R. 1 W., at road crossing ½ mile above mouth and 4½ miles north of Home. | 0.89 | 1092, 1566 | 0.09 | Aug. 29, 1947 |

Table 11. MISCELLANEOUS LOW FLOW DISCHARGE MEASUREMENTS. (Continued)

| Map No. | Stream | Location | Drain. area (sq mi) | Publication (WSP) | Minimum discharge measured | |
|---|---|---|---|---|---|---|
| | | | | | Cfs | Date |
| | KITSAP PENINSULA (continued) | | | | | |
| KP120 | Unnamed stream (tributary to Case Inlet) | NE¼ sec. 2, T. 21 N., R. 1 W., at road crossing at mouth, at Vaughn and 4½ miles north of Home. Stream enters Vaughn Bay from north. | 2.44 | 1092, 1566 | 0.01 | Aug. 29, 1947 |
| KP121 | Rocky Creek | NE¼ sec. 27, T. 22 N., R. 1 W., at highway crossing, 500 ft above mouth and 2¼ miles east of Allyn. | 18.1 | 1092, 1566 | 3.49 | Aug. 29, 1947 |
| KP122 | Unnamed stream (tributary to Coulter Creek) | S½ sec. 4, T. 22 N., R. 1 W., at road crossing, 0.2 mile above mouth and 2½ miles south of Belfair. | 2.71 | 1092, 1566 | 0.32 | Aug. 28, 1947 |
| KP123 | Unnamed stream (tributary to Coulter Creek) | SE¼NW¼ sec. 9, T. 22 N., R. 1 W., at road crossing at mouth and 2 3/4 miles south of Belfair. | 1.03 | 1092, 1566 | 1.27 | Aug. 28, 1947 |
| KP124 | Unnamed stream (tributary to Coulter Creek) | SW¼ sec. 9, T. 22 N., R. 1 W., 50 ft above mouth and 3 miles south of Belfair. Stream enters Coulter Creek above station 126. | 0.20 | 1092, 1566 | 1.14 | Aug. 28, 1947 |
| KP125 | Coulter Creek | SW¼ sec. 9, T. 22 N., R. 1 W., 200 ft above road crossing at mouth and 1½ miles north of Allyn. | 14.1 | 1092, 1566 | 15.1 | July 30, 1947 |
| | BAINBRIDGE ISLAND | | | | | |
| BA1 | Unnamed stream (tributary to Murden Cove) | SE¼SE¼ sec. 15, T. 25 N., R. 2 E., 50 ft below road crossing near mouth. | 1.54 | (a) | 0.19 | Aug. 7, 1961 |
| BA2 | Unnamed stream (tributary to Fletcher Bay) | SW¼SW¼ sec. 21, T. 25 N., R. 2 E., at road crossing on Bainbridge Island. | 0.67 | (a) | 0.34 | Aug. 7, 1961 |
| BA3 | Unnamed stream (tributary to Manzanita Bay) | SE¼NW¼ sec. 9, T. 25 N., R. 2 E., at mouth. | 1.57 | (a) | 0.81 | Aug. 7, 1961 |
| | VASHON AND MAURY ISLANDS | | | | | |
| VA1 | Unnamed stream (tributary to Puget Sound) | NE¼SE¼ sec. 29, T. 23 N., R. 3 E., at mouth. | 0.64 | (a) | *0.08 | Aug. 4, 1961 |
| VA2 | Unnamed stream (tributary to Puget Sound) | NE¼SE¼ sec. 29, T. 23 N., R. 3 E., at foot bridge 100 ft above mouth. | 0.48 | (a) | 0.12 | Aug. 4, 1961 |
| VA3 | Unnamed stream (tributary to Tramp Harbor) | At southeast corner sec. 5, T. 22 N., R. 3 E., 60 ft above mouth. | 0.90 | (a) | 0.44 | Aug. 4, 1961 |
| VA4 | Unnamed stream (tributary to Tramp Harbor) | NE¼NE¼ sec. 8, T. 22 N., R. 3 E., 10 ft above road crossing at mouth. | 0.73 | (a) | 0.53 | Aug. 4, 1961 |
| MA1 | Unnamed stream (tributary to Tramp Harbor) | SE¼NE¼ sec. 15, T. 22 N., R. 3 E., at road crossing. | 0.32 | (a) | Dry | Aug. 4, 1961 |

(a) Surface Water Records of Washington, 1961.
* Estimated

Table 11. MISCELLANEOUS LOW FLOW DISCHARGE MEASUREMENTS. (Continued)

| Map. No. | Stream | Location | Drain. area (sq mi) | Publication (WSP) | Minimum discharge measured | |
|---|---|---|---|---|---|---|
| | | | | | Cfs | Date |
| | VASHON AND MAURY ISLANDS (continued) | | | | | |
| MA2 | Unnamed stream (tributary to Quartermaster Harbor) | SE¼SW¼ sec. 16, T. 22 N., R. 3 E., at mouth. | 0.53 | (a) | 0.04 | Aug. 4, 1961 |
| VA5 | Unnamed stream (tributary to Quartermaster Harbor) | SE¼SW¼ sec. 8, T. 22 N., R. 3 E., below duck pond at mouth. | 0.43 | (a) | 0.10 | Aug. 4, 1961 |
| VA6 | Judd Creek | NW¼NE¼ sec. 18, T. 22 N., R. 3 E., 0.1 mile above road crossing at mouth. | 5.04 | (a) | 2.10 | July 3, 1961 |
| VA7 | Fisher Creek | SW¼NW¼ sec. 19, T. 22 N., R. 3 E., 150 ft below road crossing at mouth. | 1.95 | (a) | 0.88 | Aug. 4, 1961 |
| VA8 | Unnamed stream (tributary to Quartermaster Harbor) | NE¼SE¼ sec. 24, T. 22 N., R. 2 E., 100 ft above mouth. | 0.44 | (a) | 0.14 | Aug. 4, 1961 |
| VA9 | Tahlequah Creek | SE¼SE¼ sec. 2, T. 21 N., R. 2 E., 400 ft above mouth. | 1.17 | (a) | 0.31 | Aug. 4, 1961 |
| VA10 | Unnamed stream (tributary to Colvos Passage) | NE¼SE¼ sec. 34, T. 22 N., R. 2 E., at mouth. | 0.06 | (a) | *0.4 | Aug. 4, 1961 |
| VA11 | Unnamed stream (tributary to Colvos Passage) | SE¼NW¼ sec. 26, T. 22 N., R. 2 E., near mouth. | 0.17 | (a) | *0.4 | Aug. 4, 1961 |
| VA12 | Jod Creek | NW¼NW¼ sec. 14, T. 22 N., R. 2 E., at mouth. | 0.77 | (a) | 0.78 | Aug. 4, 1961 |
| VA13 | Green Valley Creek | SW¼NE¼ sec. 11, T. 22 N., R. 2 E., 300 ft above mouth. | 0.42 | (a) | 0.88 | Aug. 4, 1961 |
| VA14 | Unnamed stream (tributary to Colvos Passage) | S½NE¼ sec. 35, T. 23 N., R. 2 E., at road crossing 0.8 mile south of cove. | 0.07 | (a) | *0.6 | Aug. 4, 1961 |
| VA15 | Needle Creek | SW¼SW¼ sec. 18, T. 23 N., R. 3 E., 60 ft below road crossing near mouth. | 2.83 | (a) | 0.23 | Aug. 4, 1961 |

(a) Surface Water Records of Washington, 1961.
* Estimated.

UNION RIVER NEAR BREMERTON

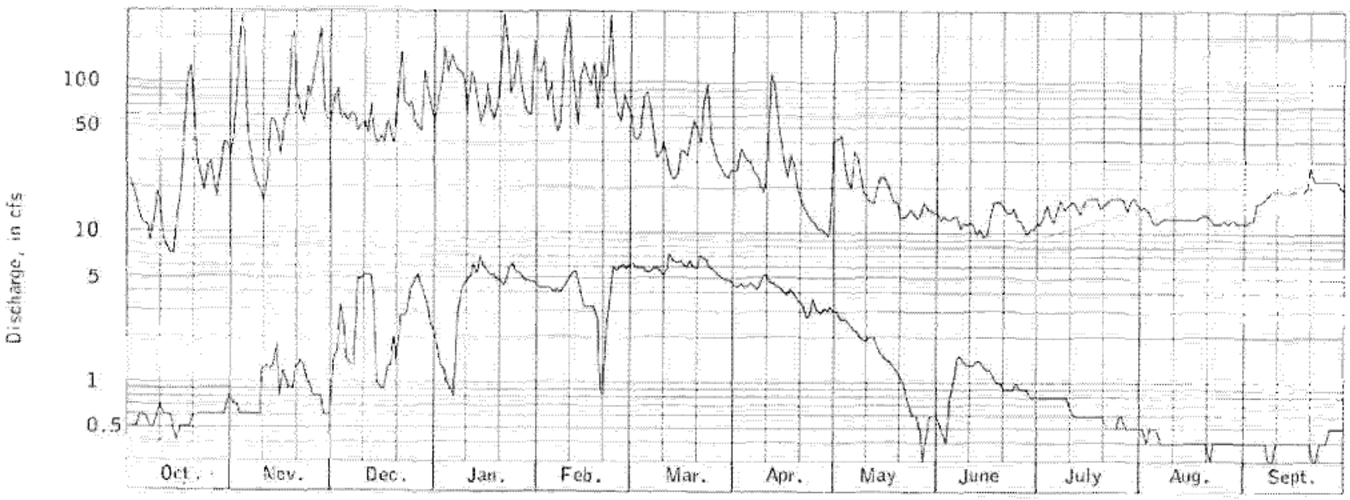



Figure 31. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1946-59.

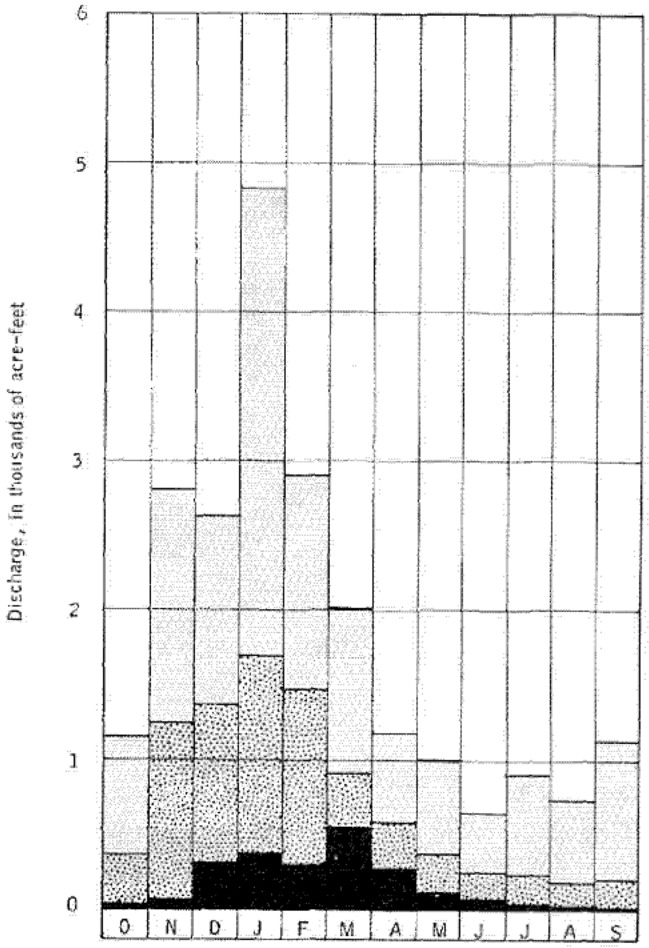



Figure 32. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1946-59.

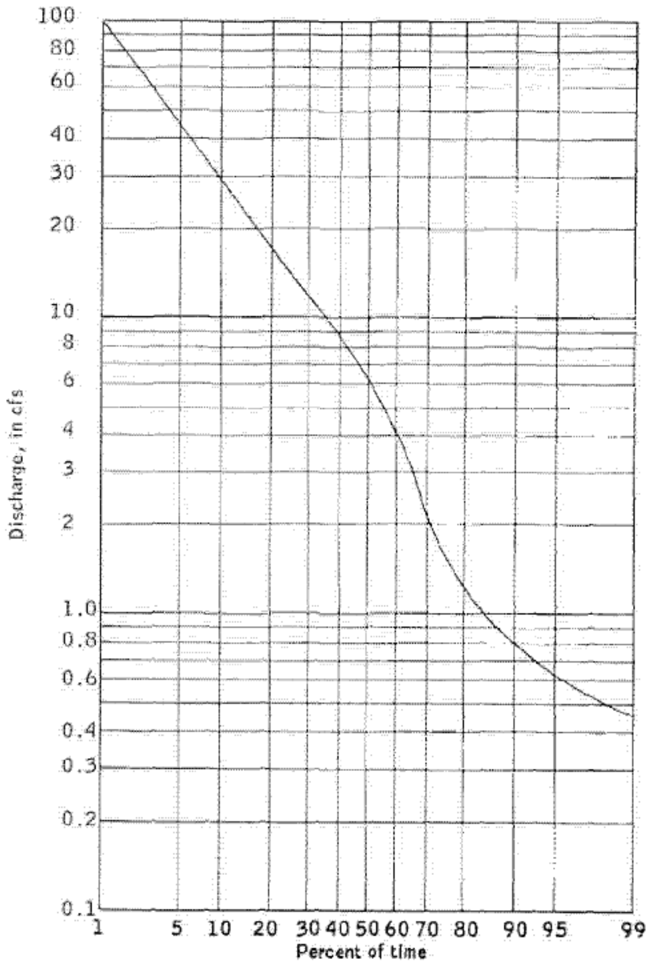



Figure 33. FLOW-DURATION CURVE FOR THE PERIOD 1946-59.

UNION RIVER NEAR BREMERTON

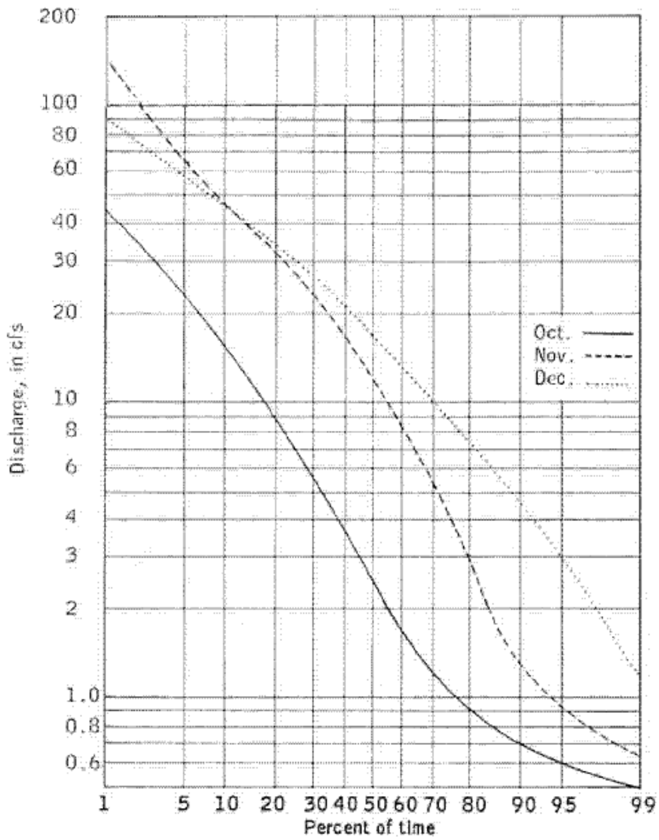



Figure 34a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1946-59.

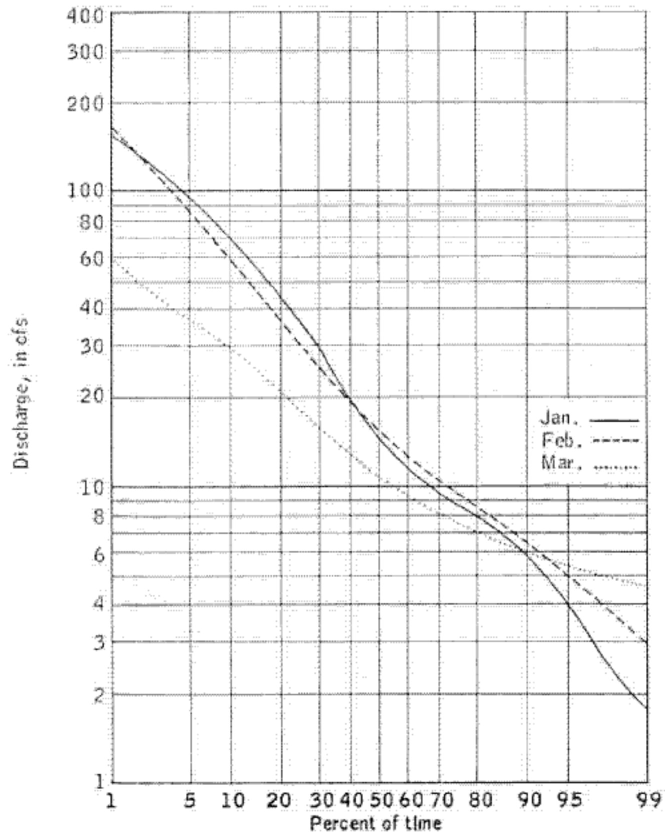



Figure 34b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1946-59.

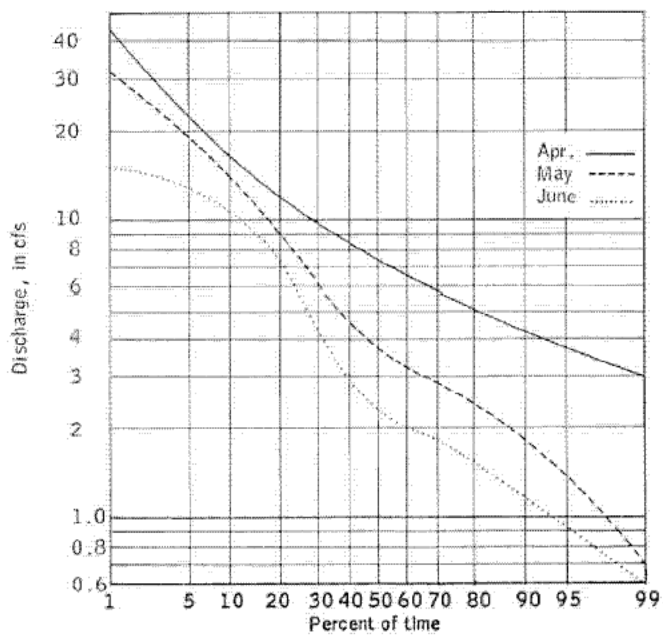



Figure 34c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1946-59.

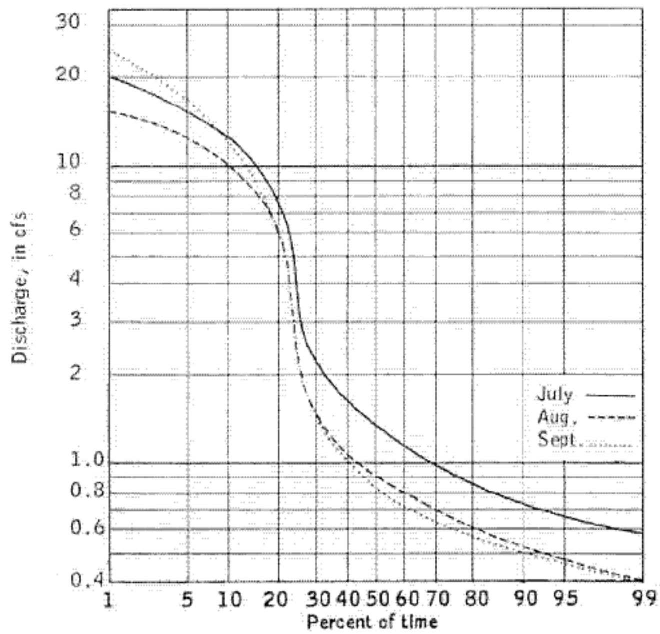



Figure 34d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1946-59.

UNION RIVER NEAR BELFAIR

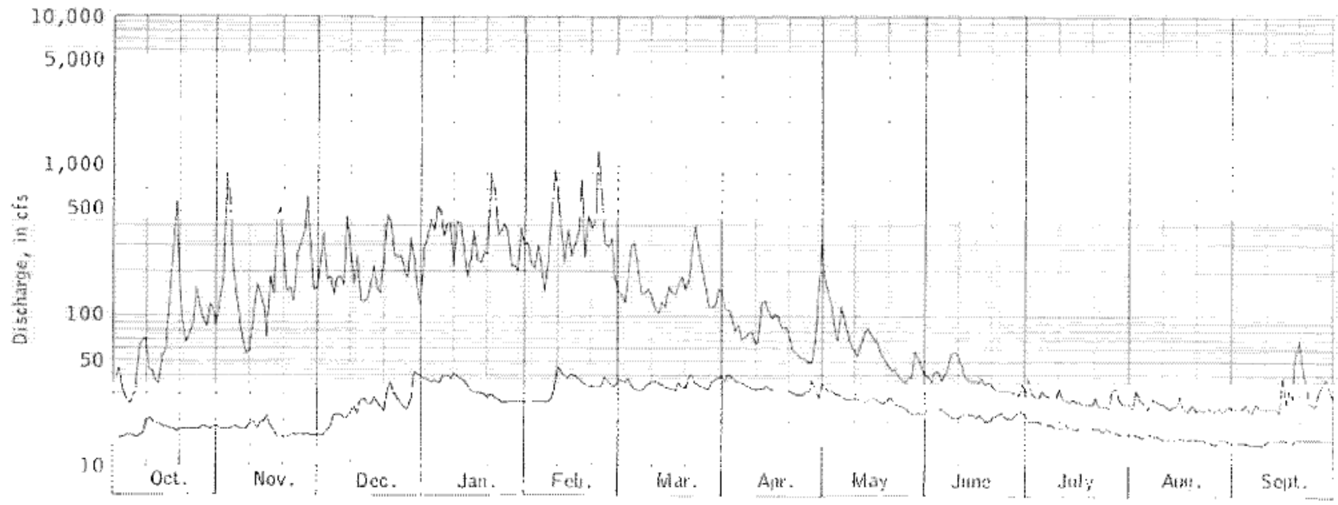



Figure 35. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1947-59.

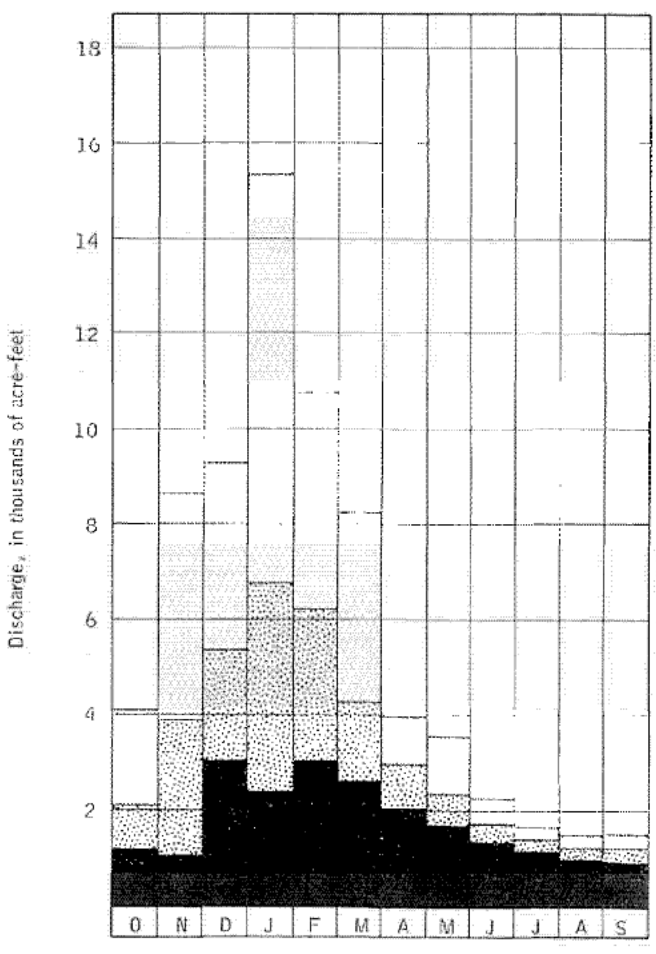



Figure 36. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1947-59.

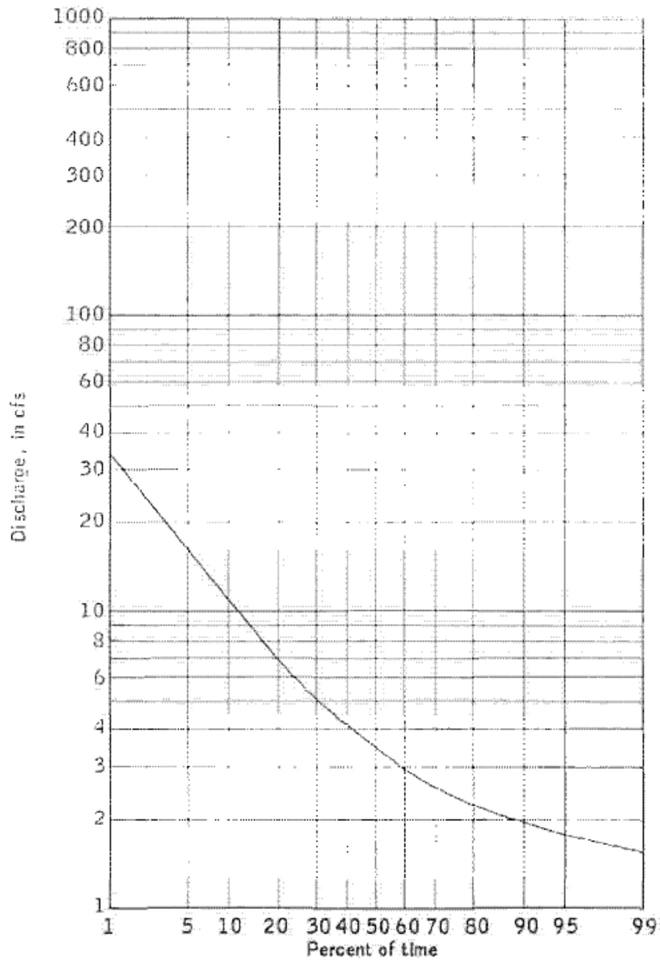



Figure 37. FLOW-DURATION CURVE FOR THE PERIOD 1948-59.

UNION RIVER NEAR BELFAIR

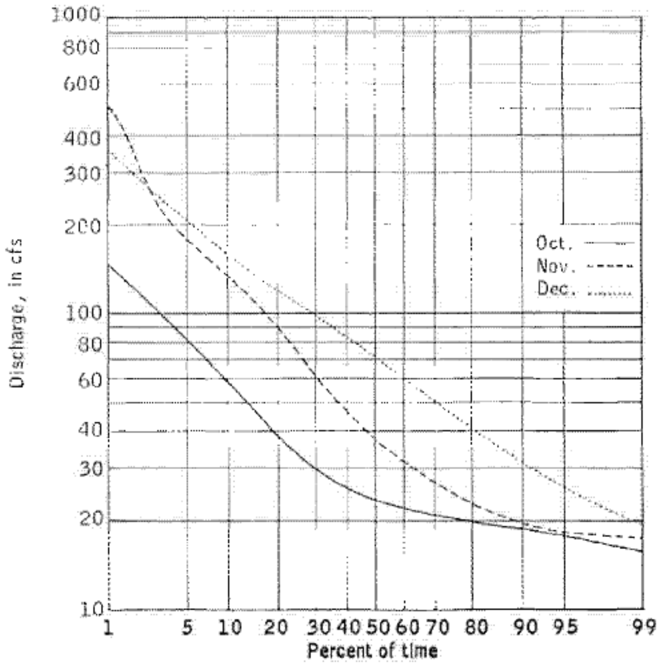



Figure 38a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1948-59.

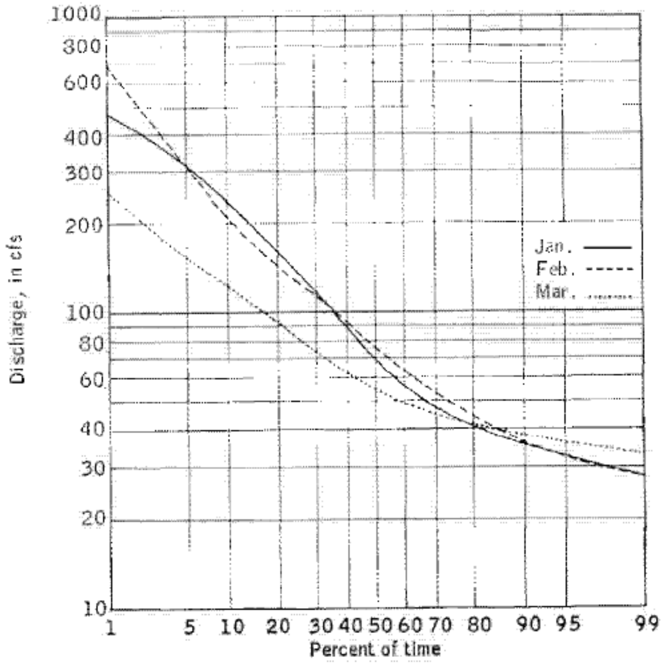



Figure 38b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1948-59.

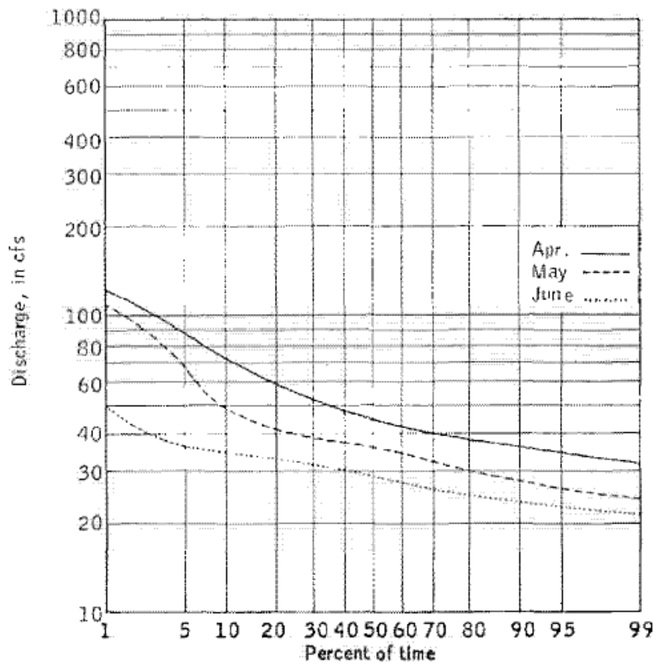



Figure 38c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1948-59.

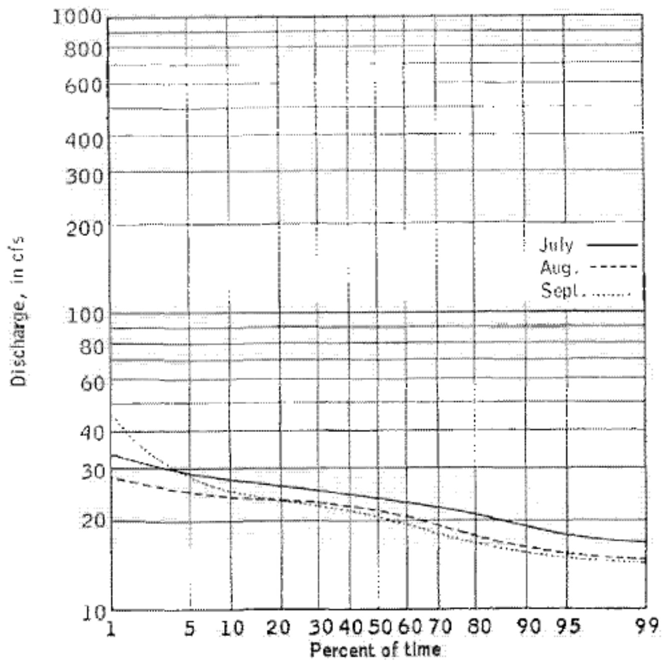



Figure 38d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1948-59.

MISSION CREEK NEAR BREMERTON

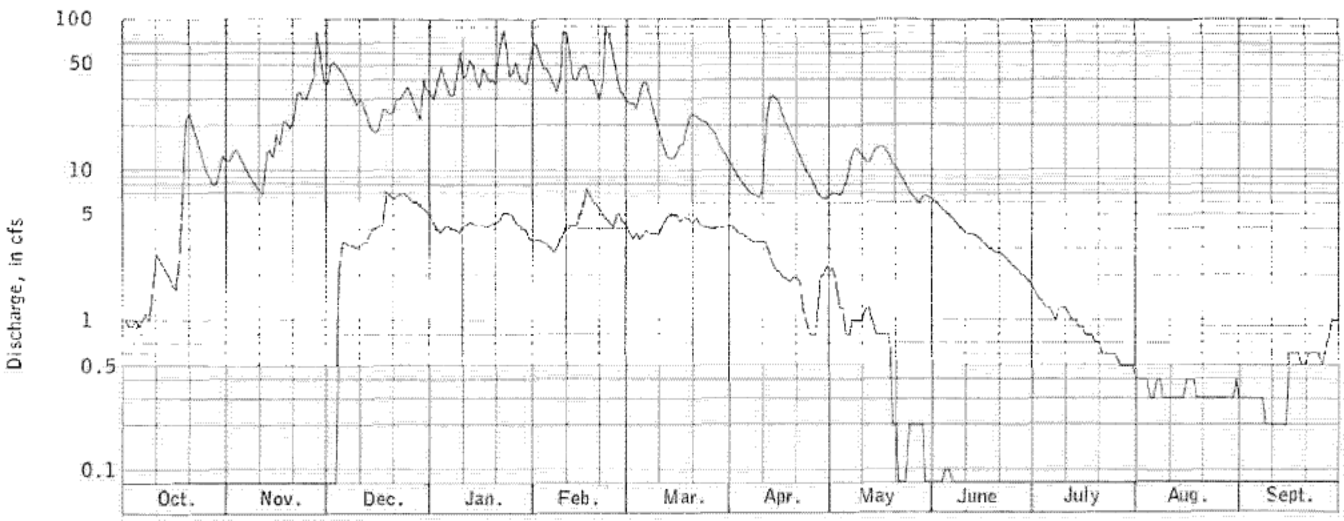



Figure 39. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1945-53.

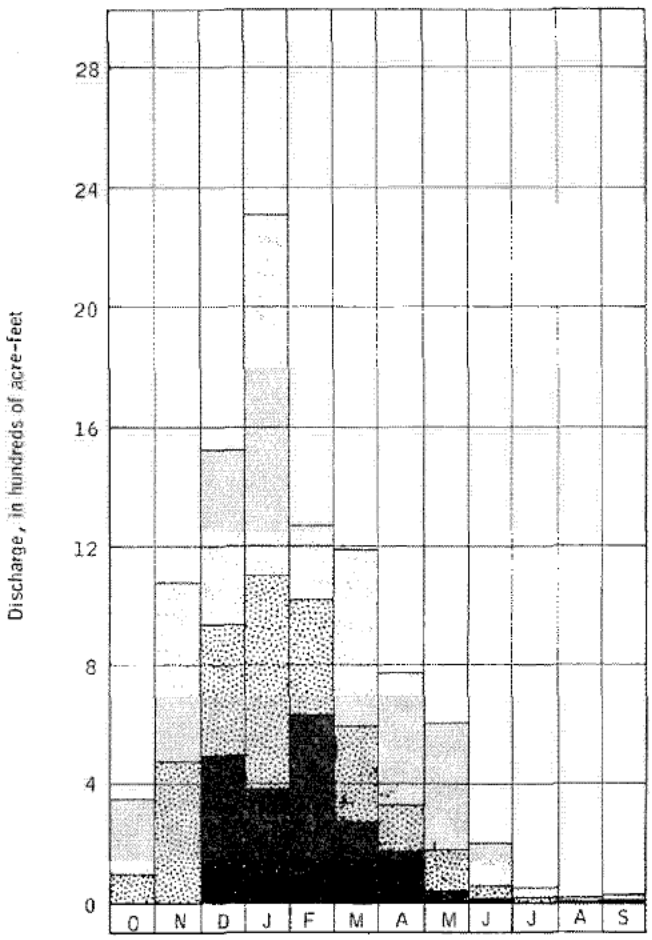



Figure 40. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1945-53.

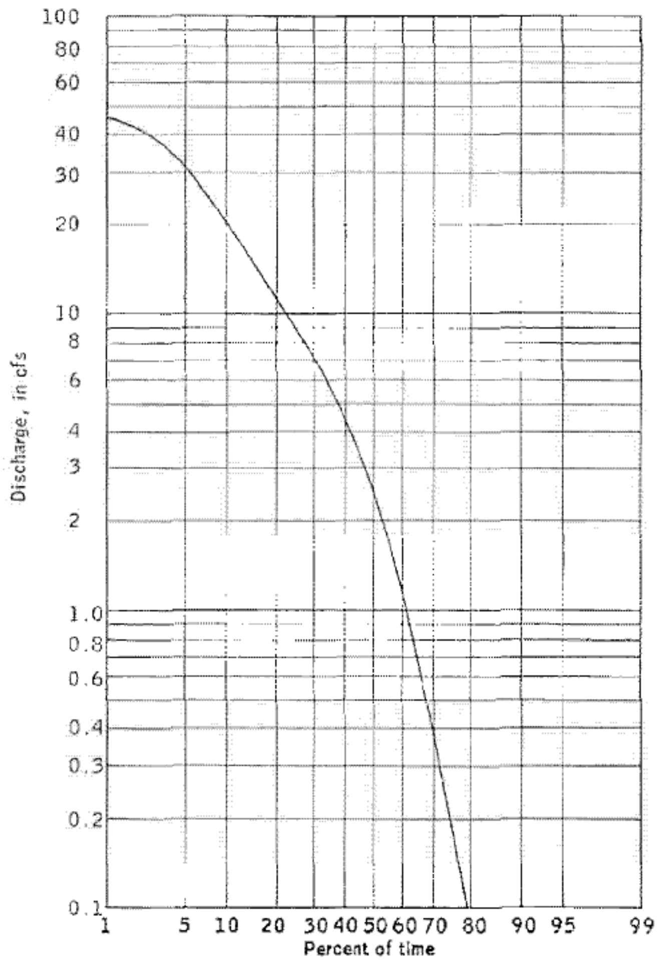



Figure 41. FLOW-DURATION CURVE FOR THE PERIOD 1946-53.

MISSION CREEK NEAR BREMERTON

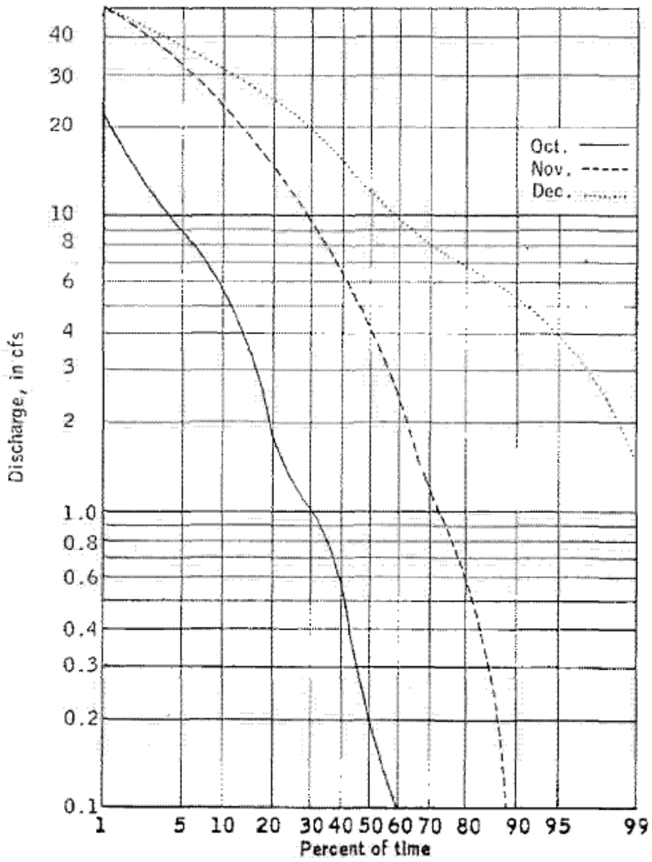



Figure 42a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1946-53.

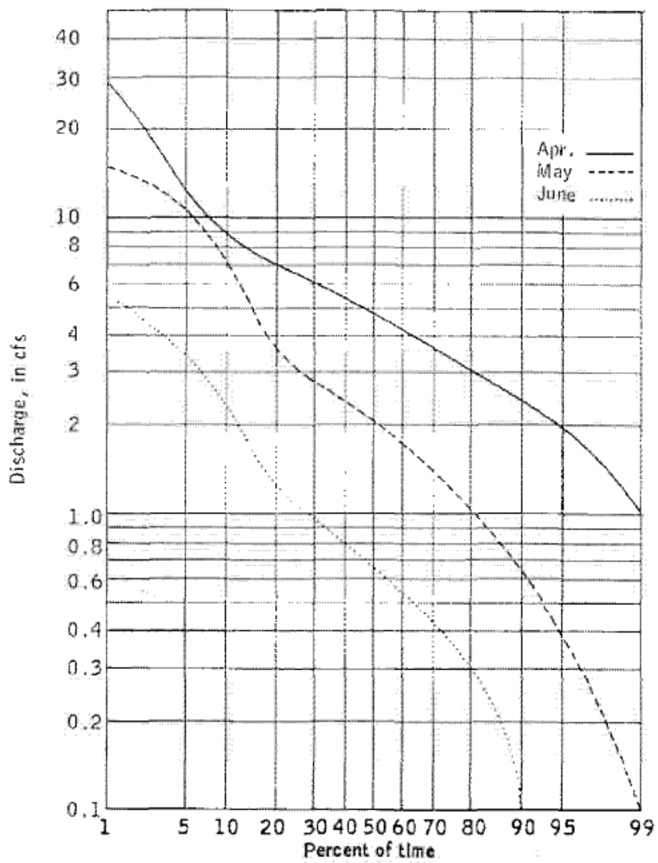



Figure 42b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1946-53.

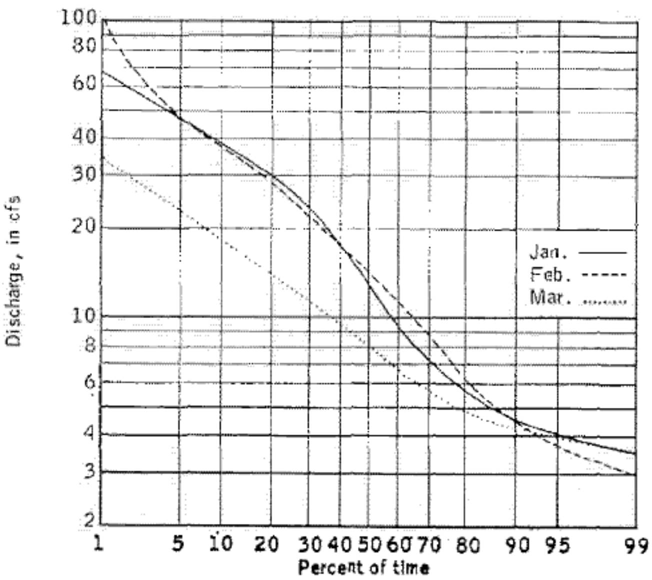



Figure 42c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1946-53.

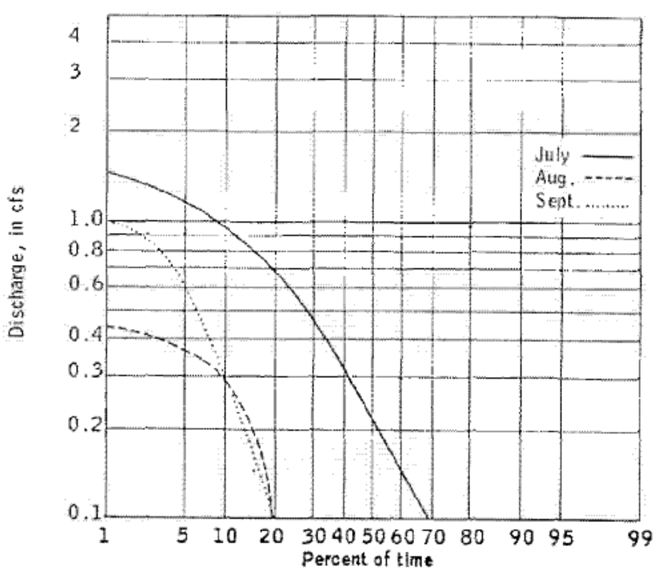



Figure 42d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1946-53.

MISSION CREEK NEAR BELFAIR

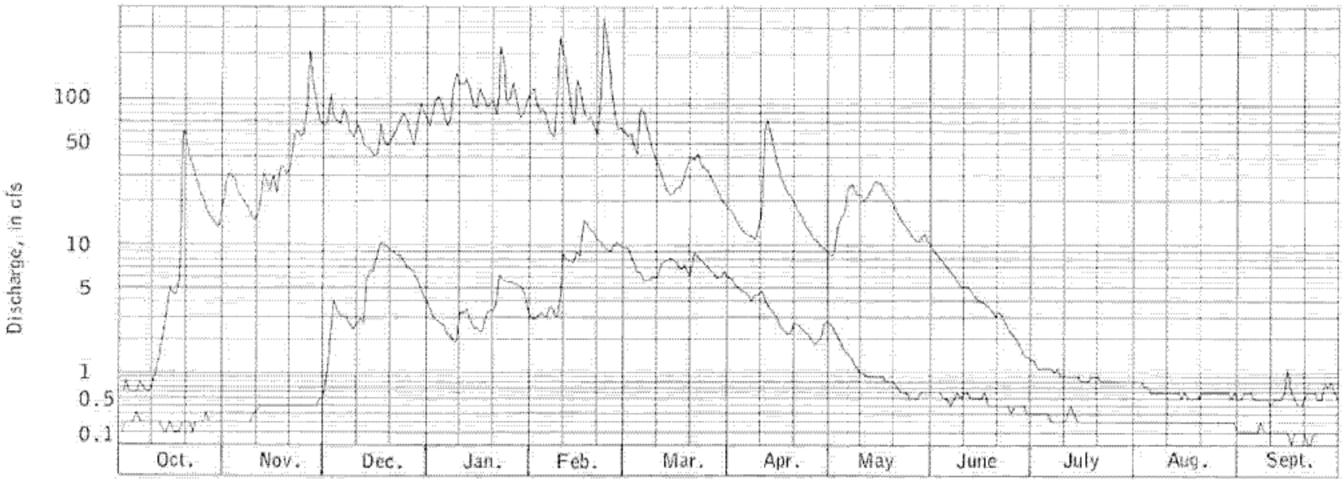



Figure 43. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1946-53.

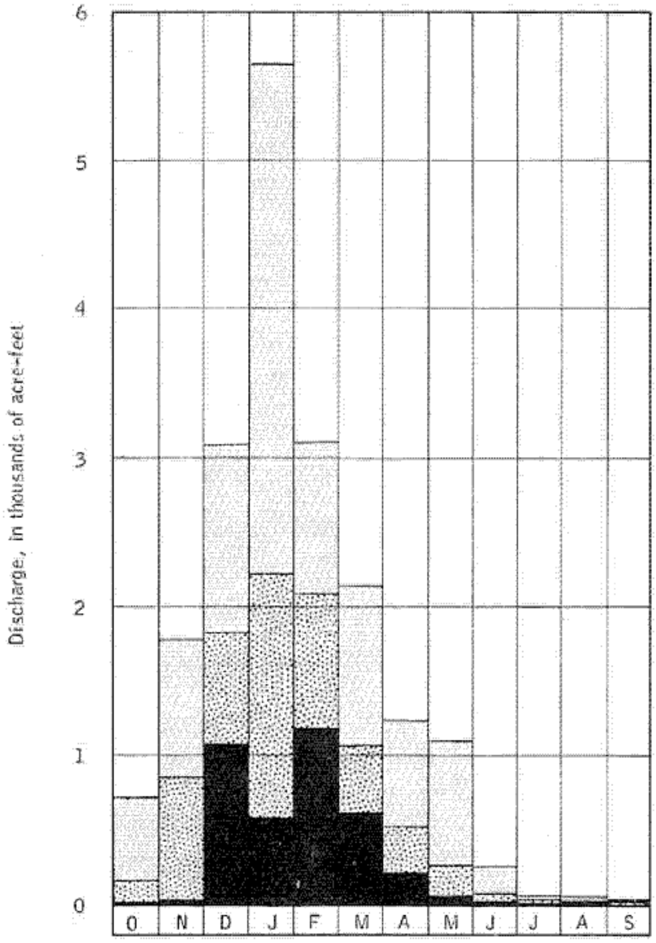



Figure 44. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1946-53.

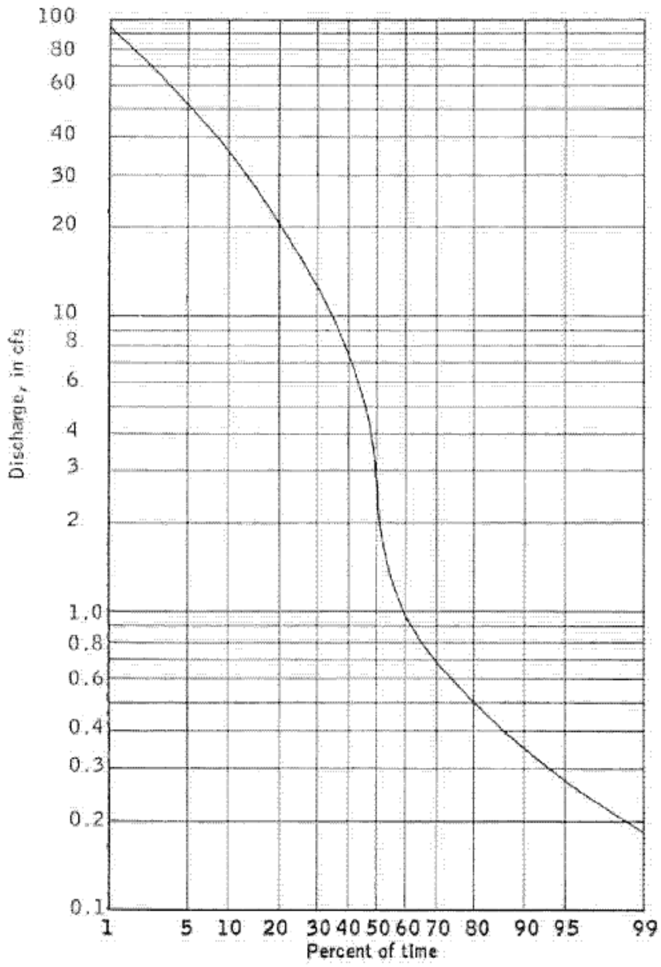



Figure 45. FLOW-DURATION CURVE FOR THE PERIOD 1946-53.

MISSION CREEK NEAR BELFAIR

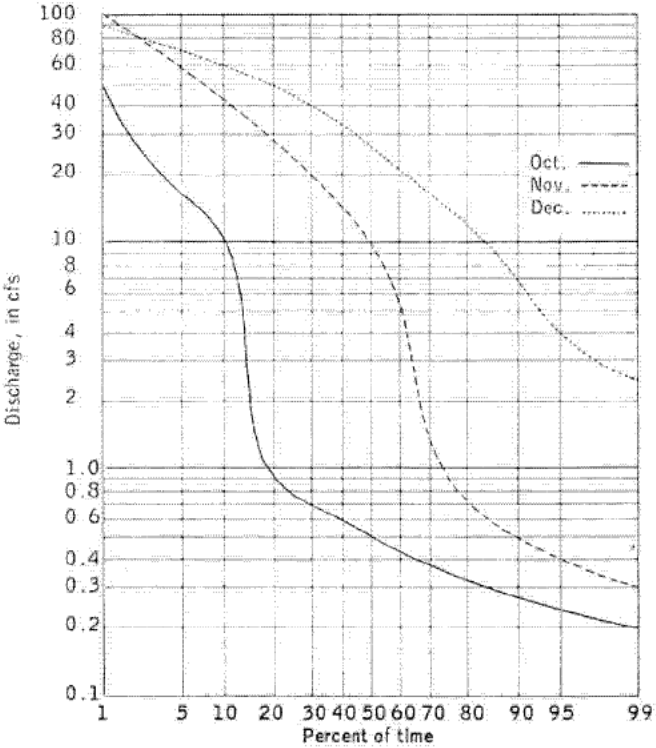



Figure 46a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1946-53.

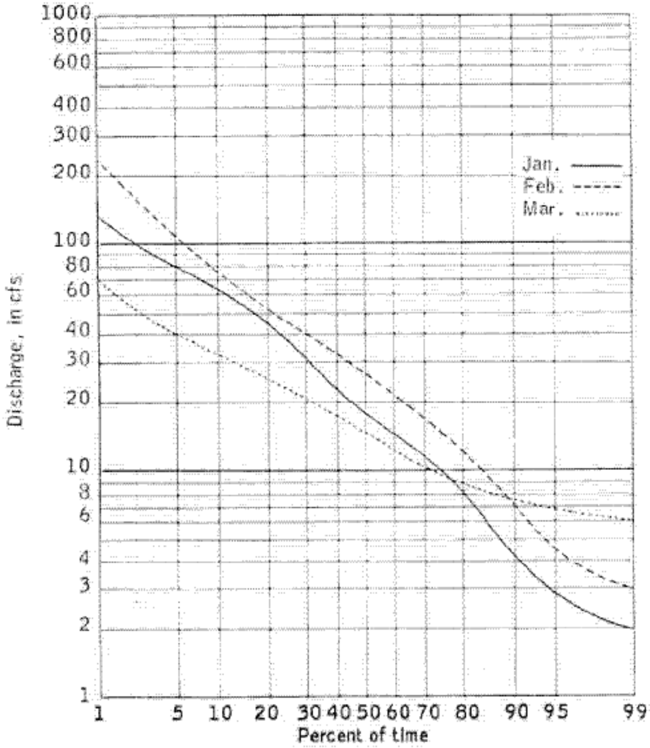



Figure 46b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1946-53.

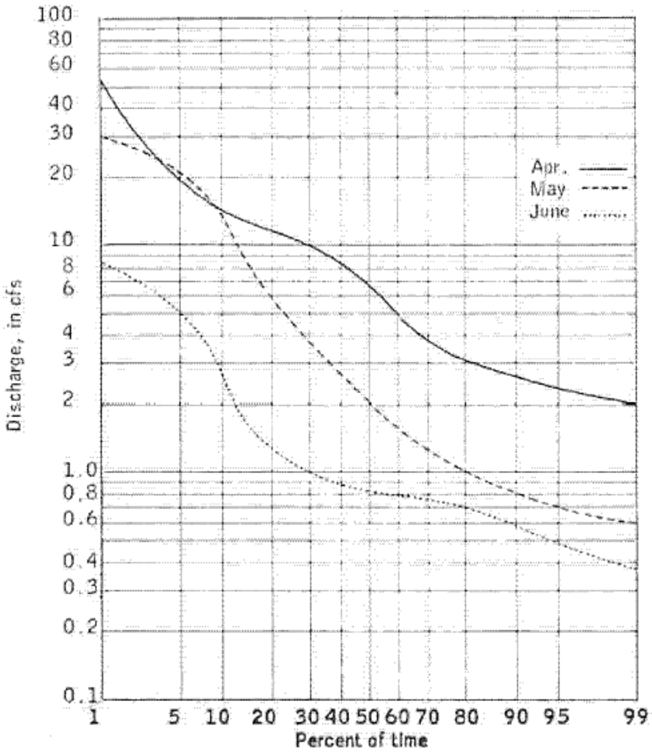



Figure 46c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1946-53.

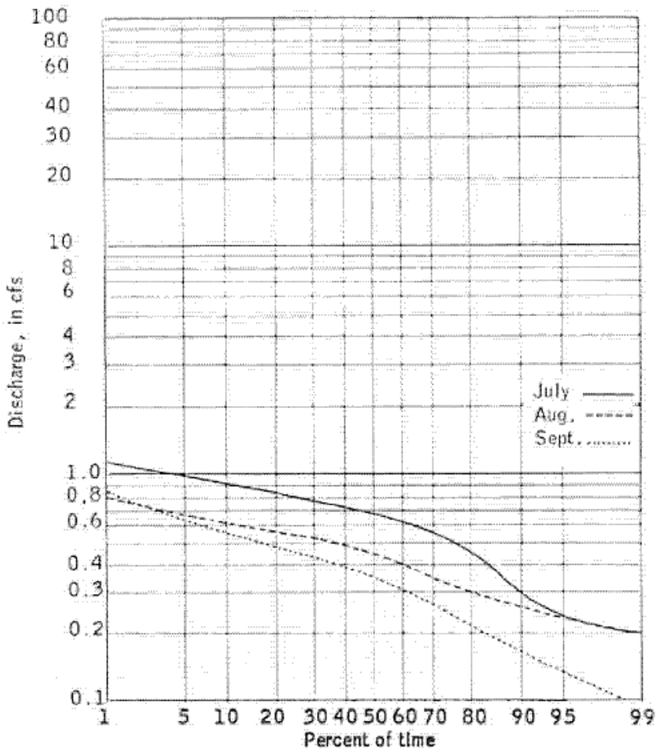



Figure 46d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1946-53.

GOLD CREEK NEAR BREMERTON

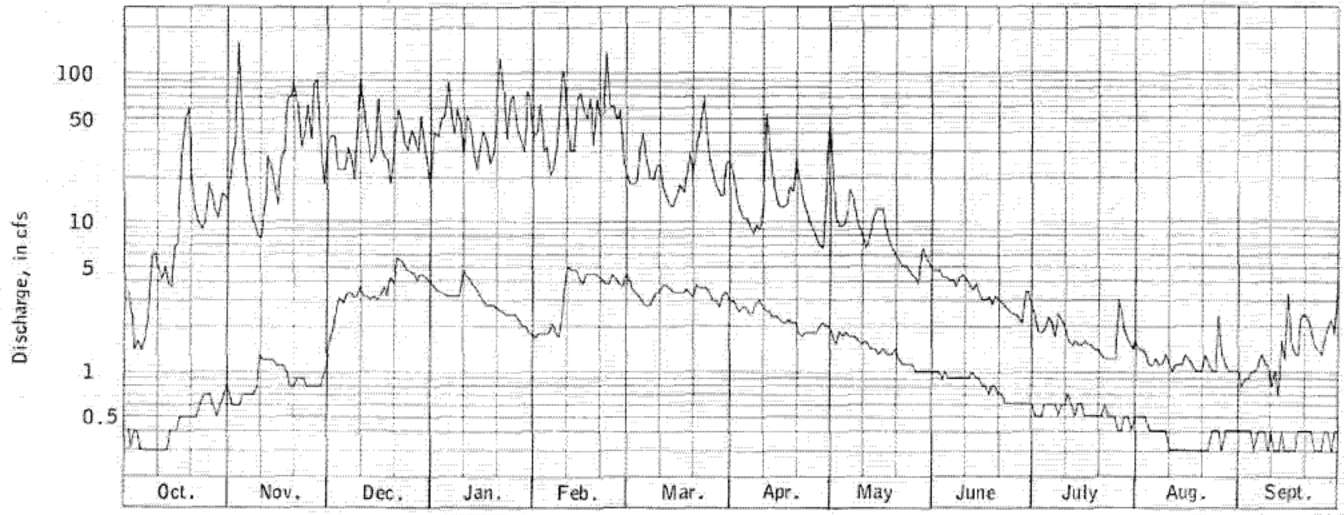



Figure 47. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1946-60.

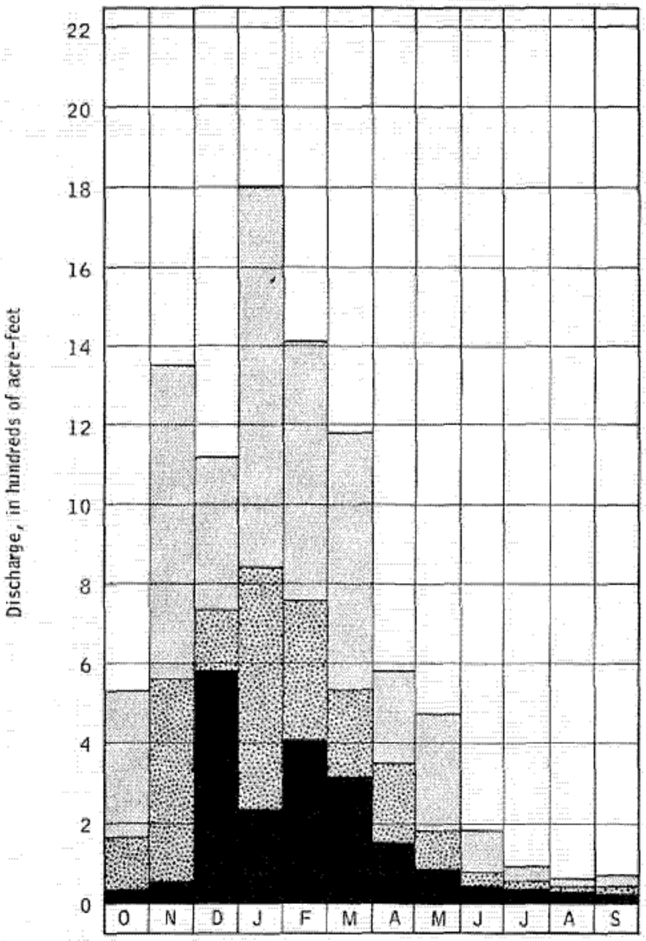



Figure 48. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1946-60.

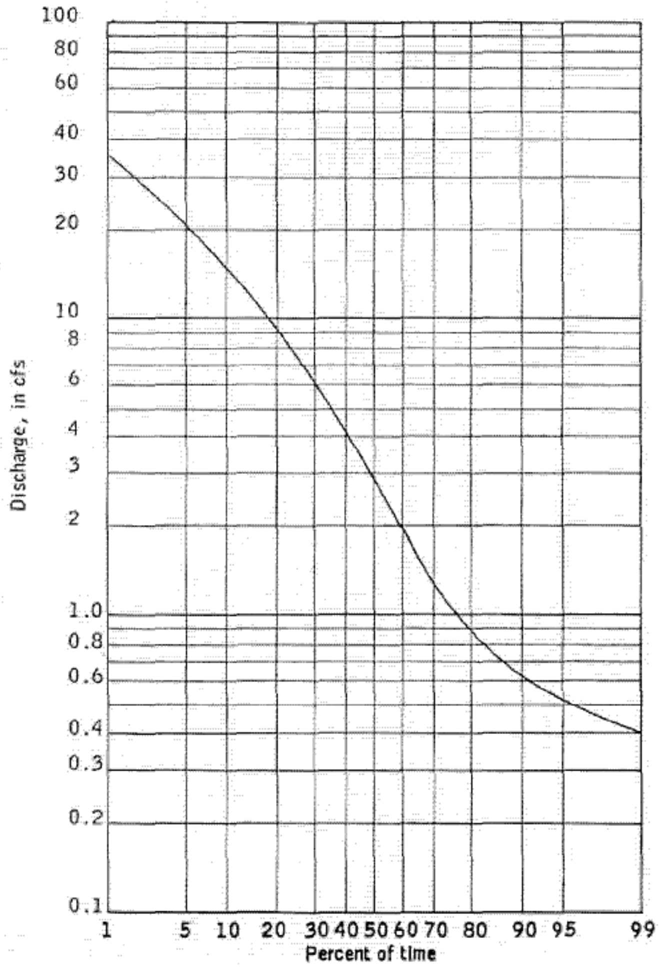



Figure 49. FLOW-DURATION CURVE FOR THE PERIOD 1946-60.

GOLD CREEK NEAR BREMERTON

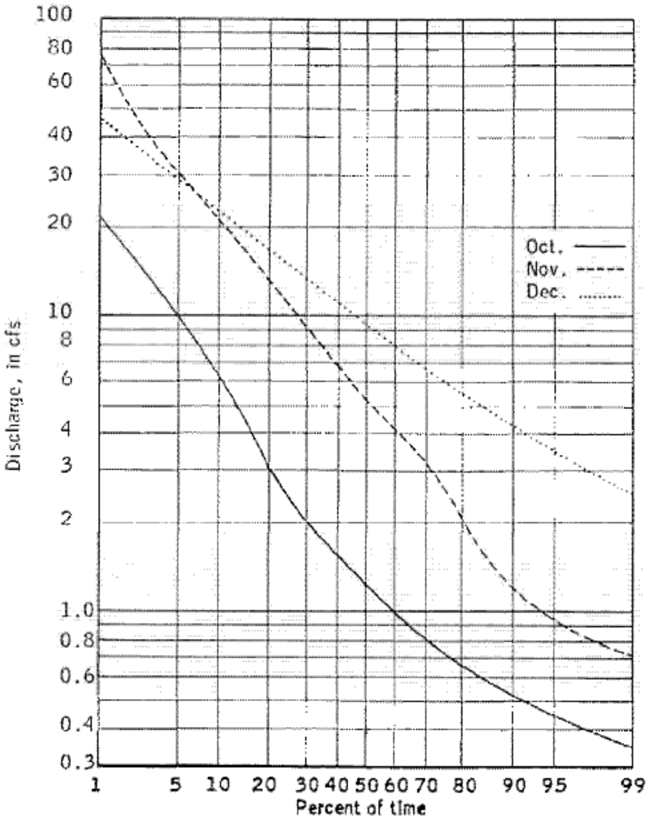



Figure 50a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1946-60.

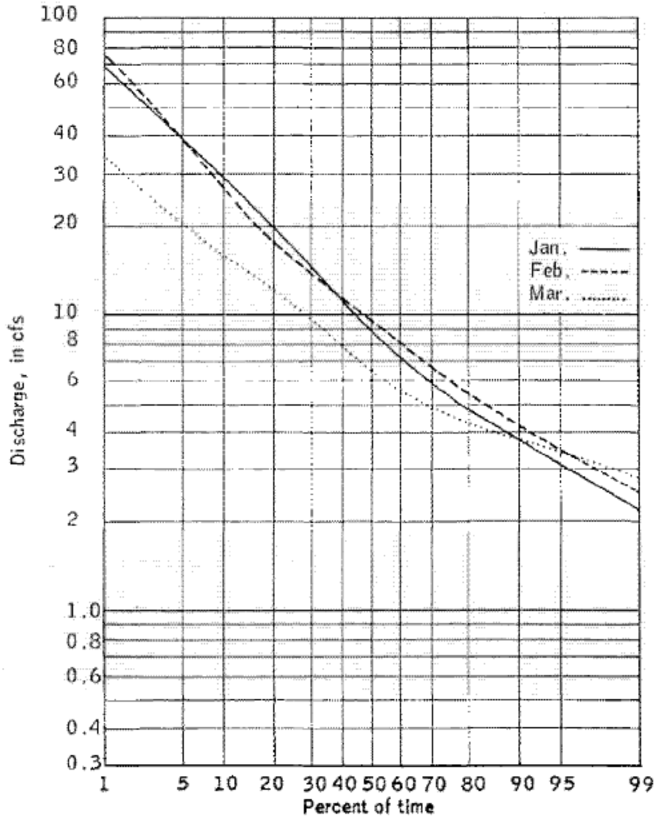



Figure 50b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1946-60.

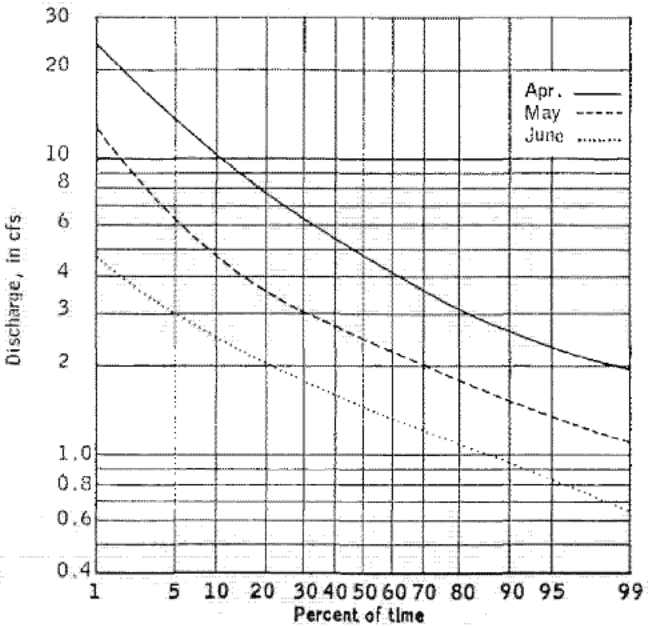



Figure 50c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1946-60.

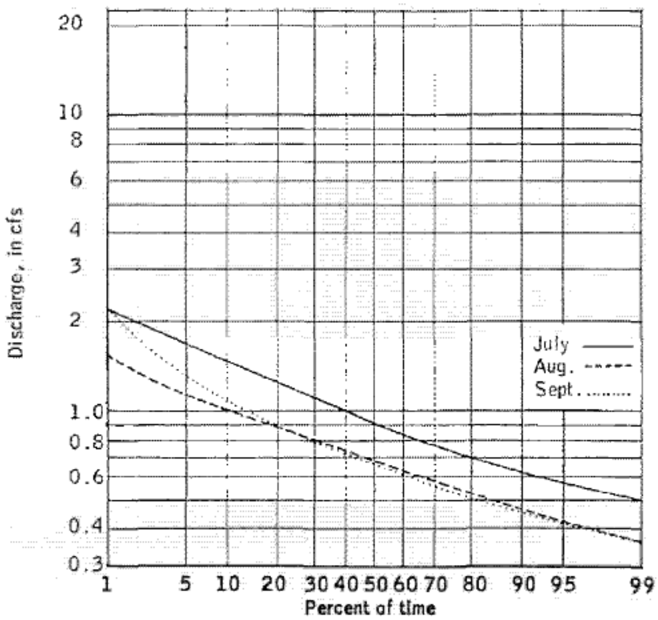



Figure 50d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1946-60.

TAHUYA RIVER NEAR BREMERTON

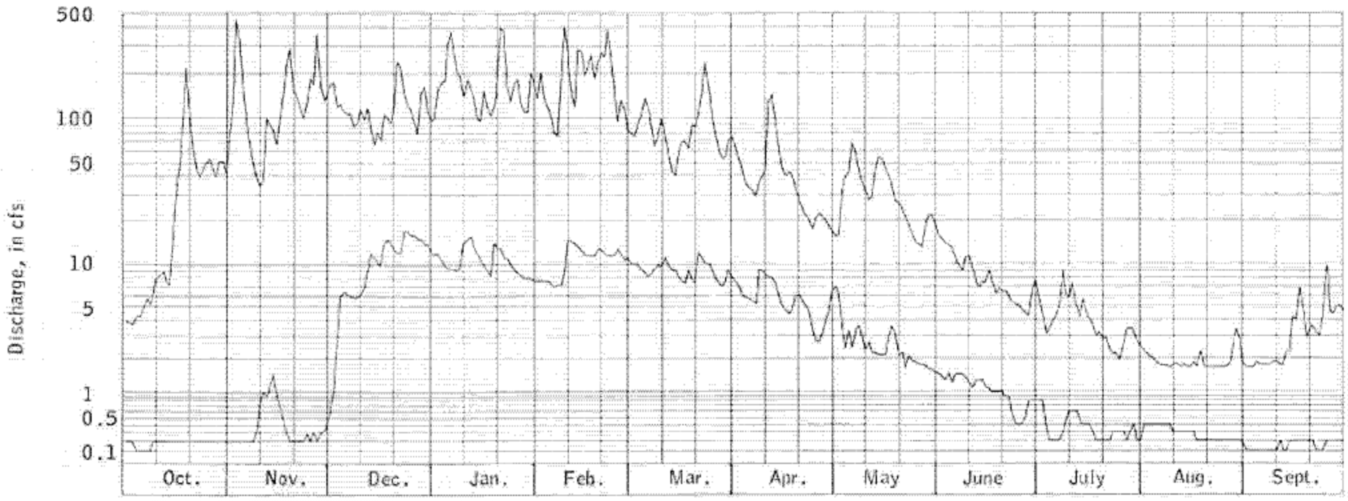



Figure 51. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1945-56.

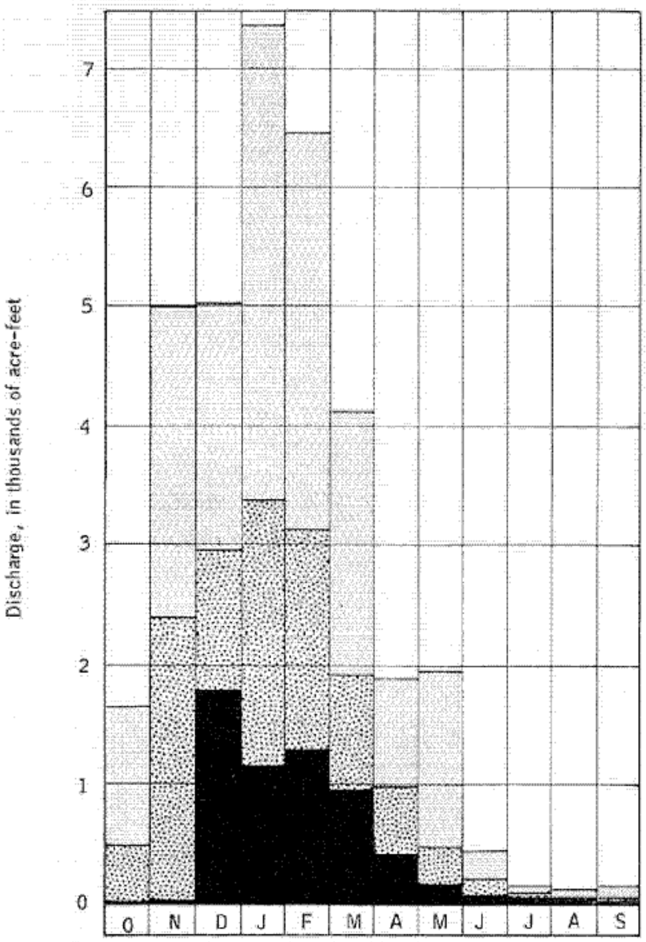



Figure 52. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1945-56.

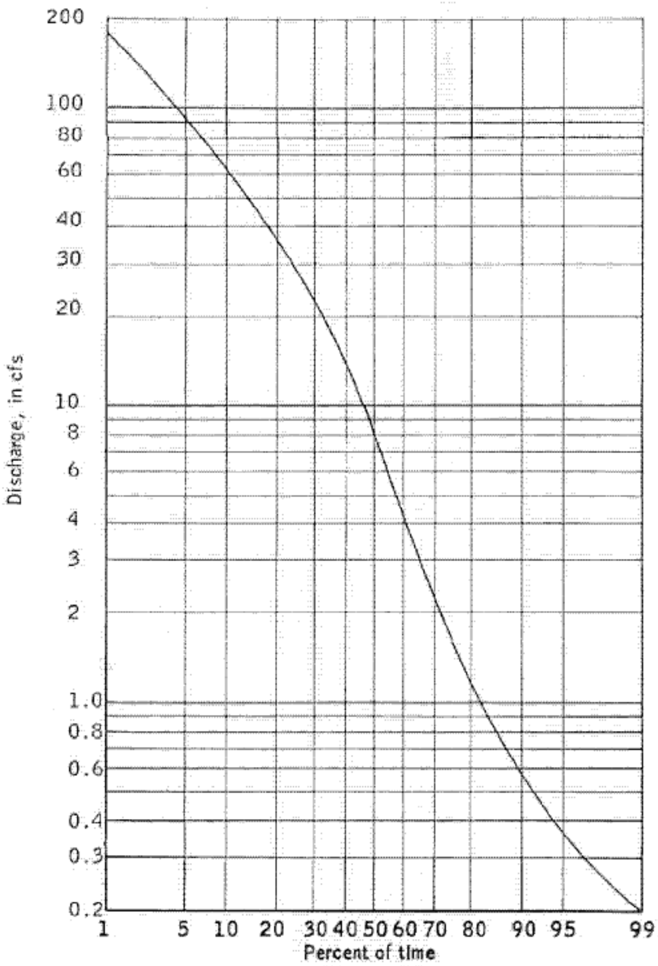



Figure 53. FLOW-DURATION CURVE FOR THE PERIOD 1946-56.

TAHUYA RIVER NEAR BREMERTON

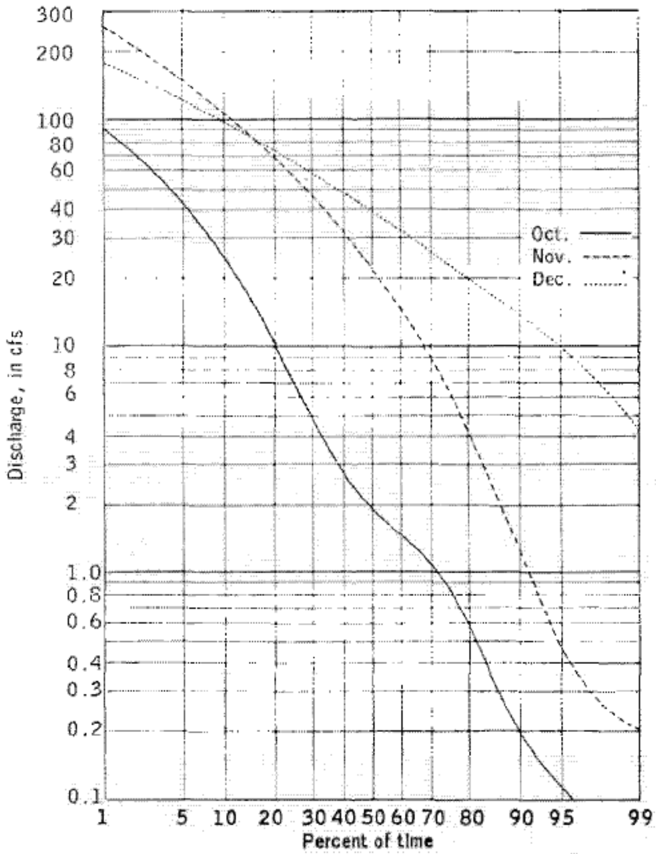



Figure 54a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1946-56.

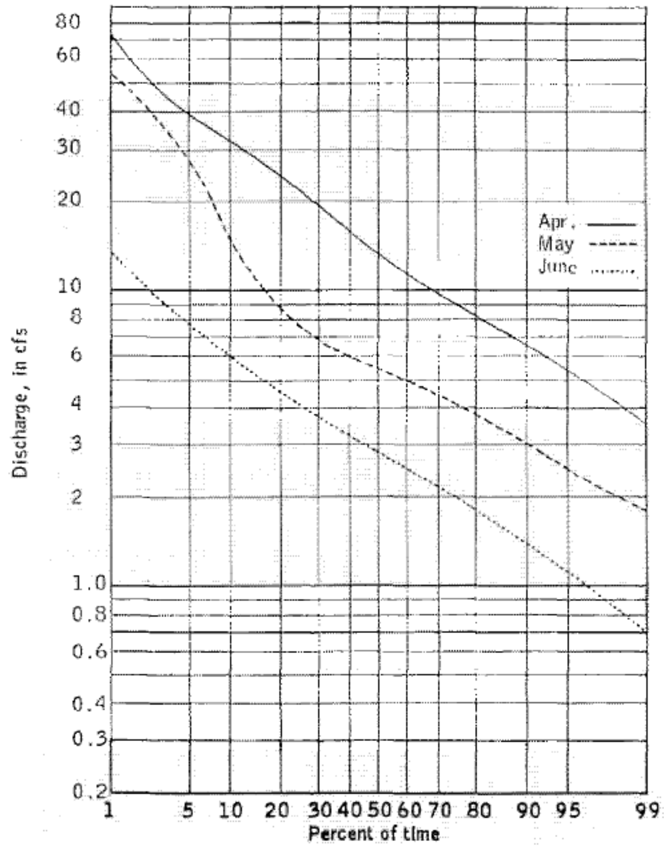



Figure 54b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1946-56.

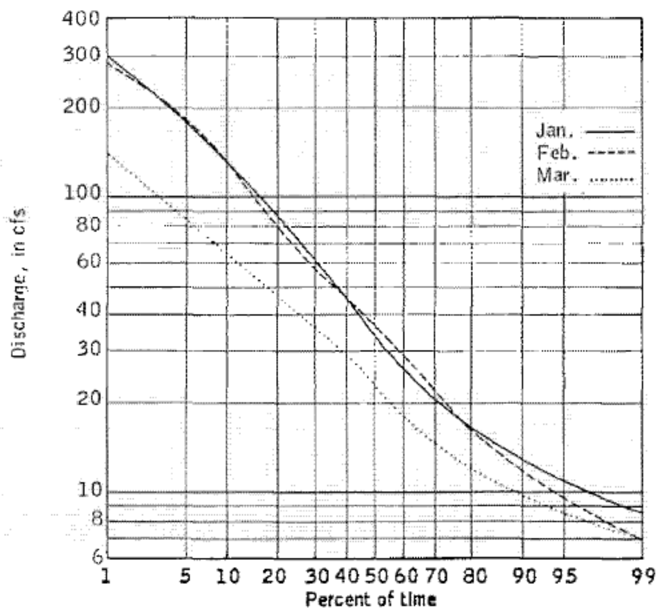



Figure 54c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1946-56.

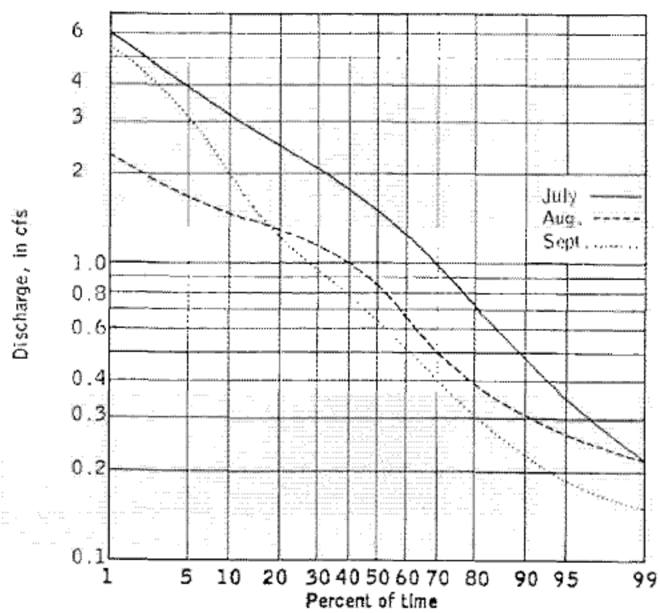



Figure 54d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1946-56.

PANTHER CREEK NEAR BREMERTON

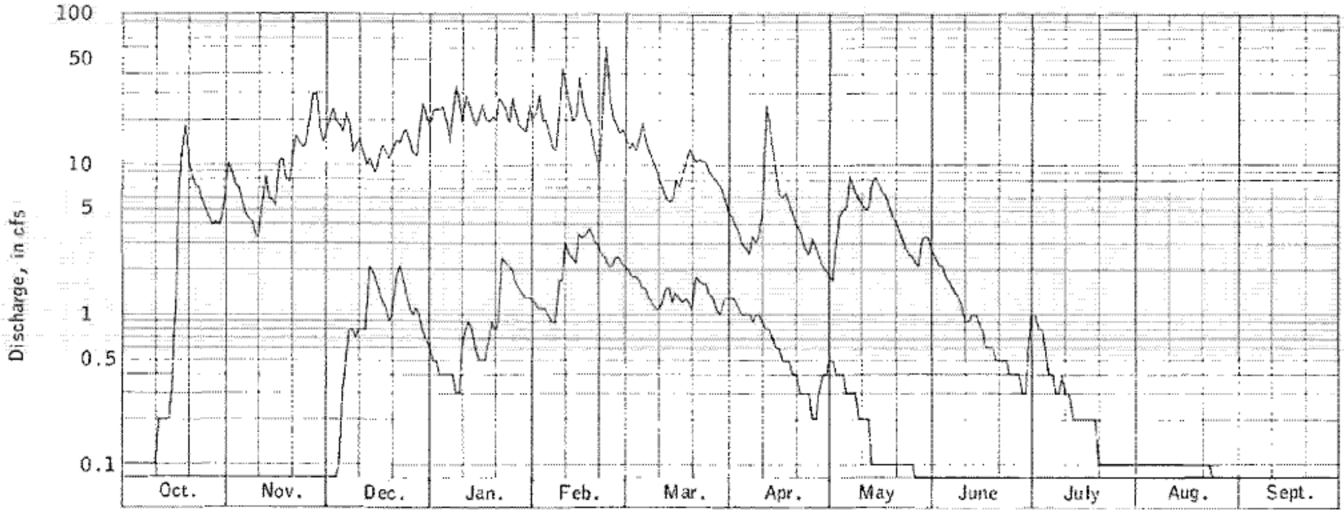



Figure 55. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1945-53.

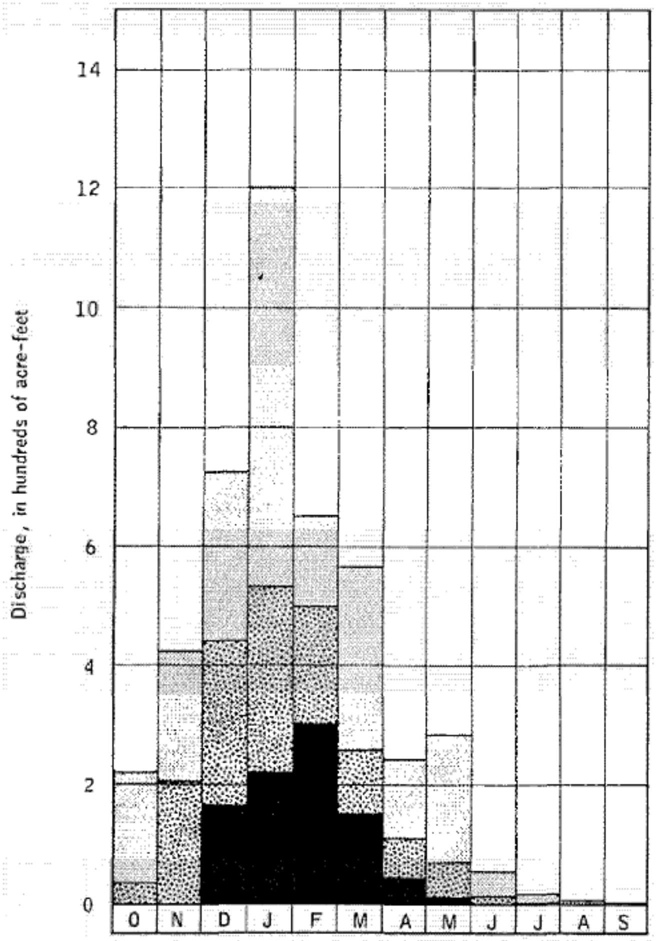



Figure 56. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1945-53.

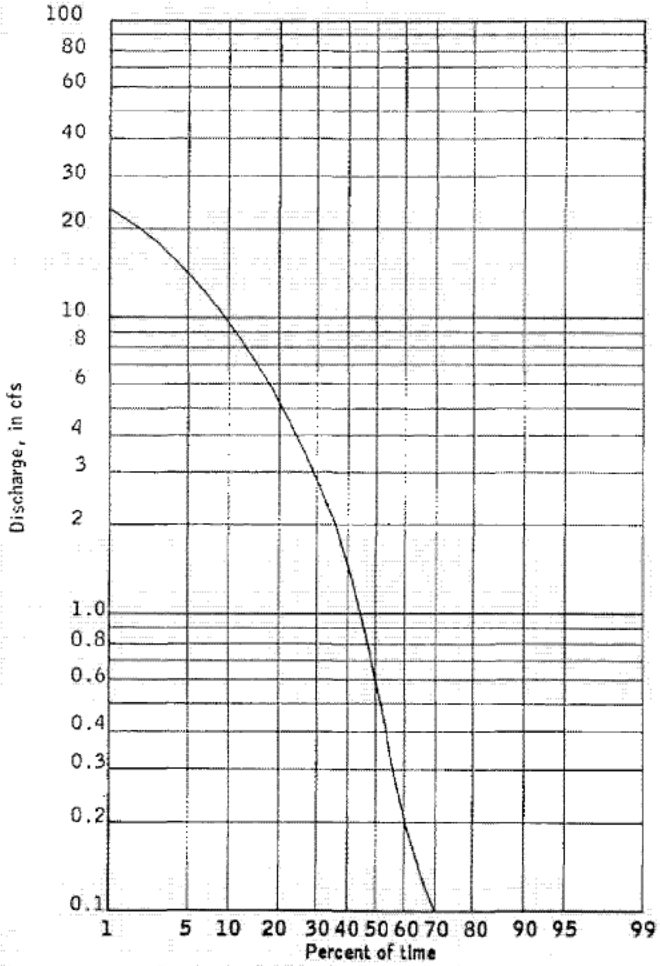



Figure 57. FLOW-DURATION CURVE FOR THE PERIOD 1946-53.

PANTHER CREEK NEAR BREMERTON

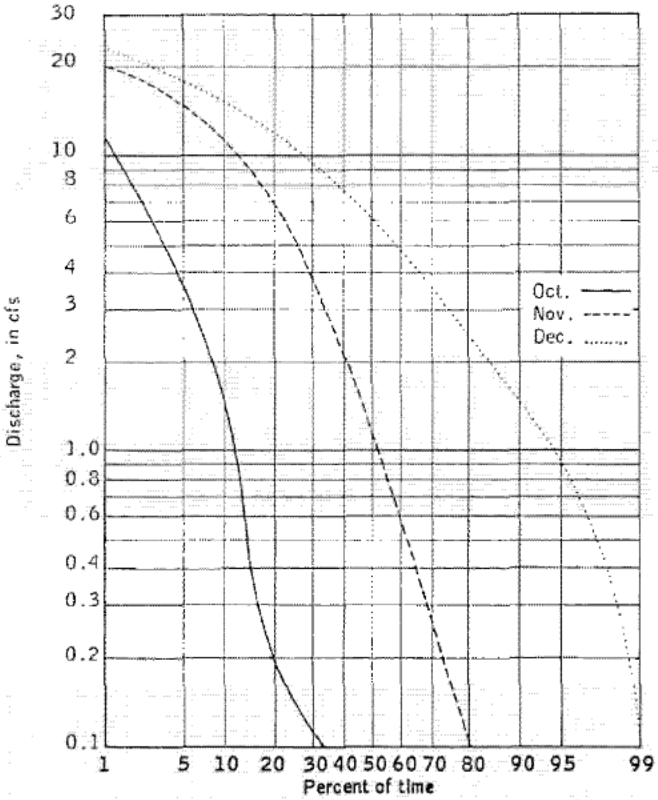



Figure 58a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1946-53.

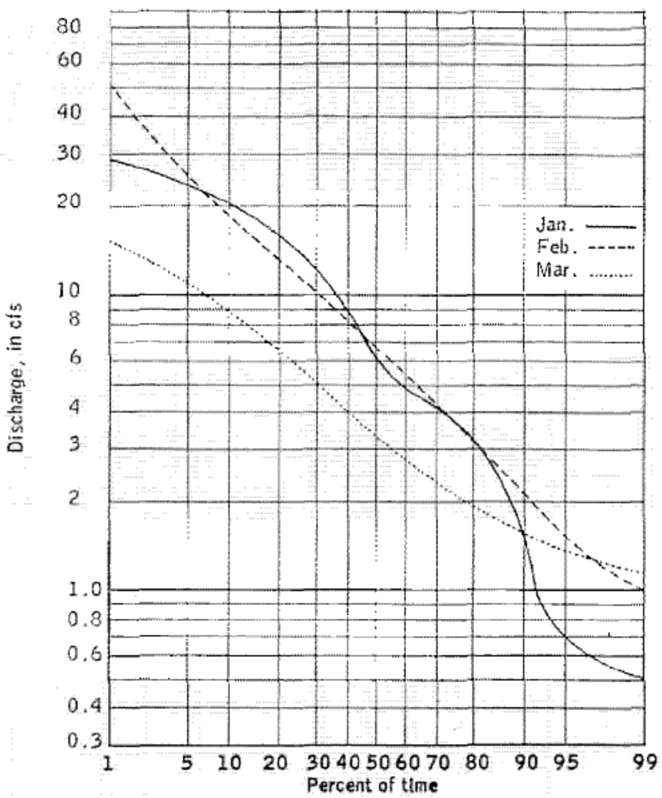



Figure 58b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1946-53.

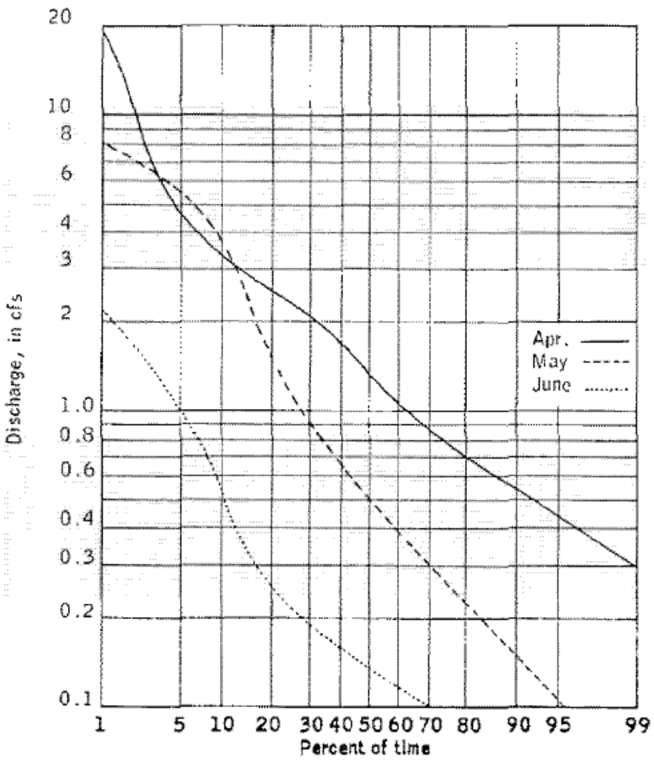



Figure 58c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1946-53.

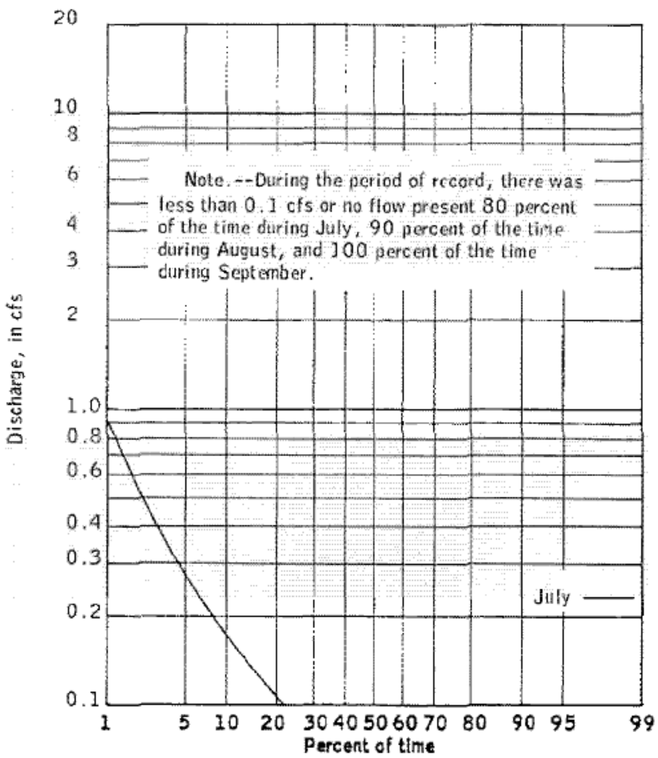



Figure 58d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1946-53.

TAHUYA RIVER NEAR BELFAIR

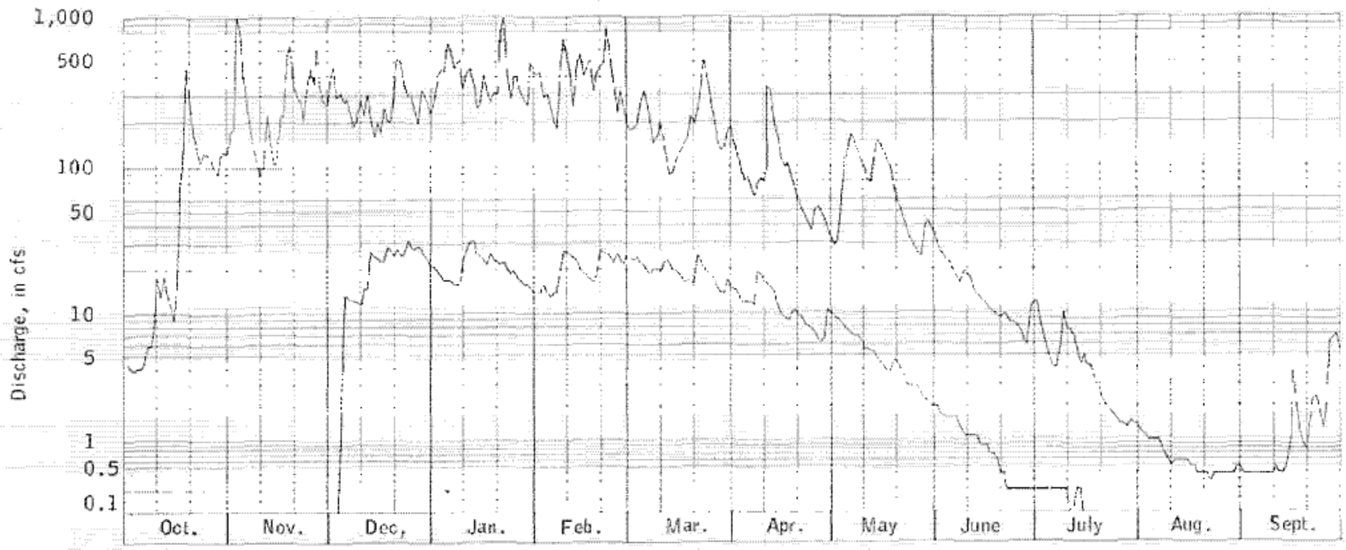



Figure 59. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1945-56.

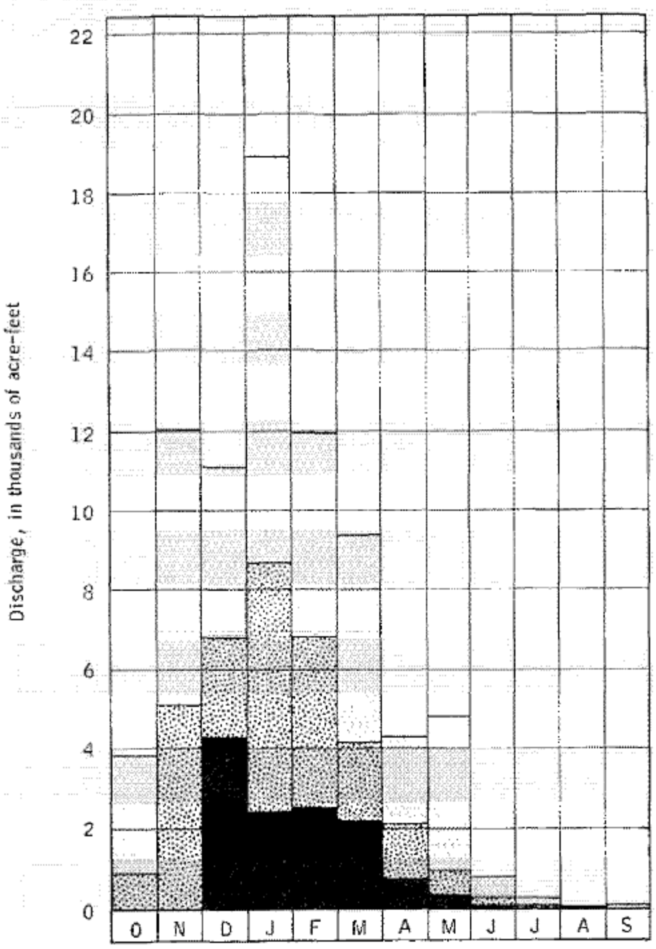



Figure 60. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1945-56.

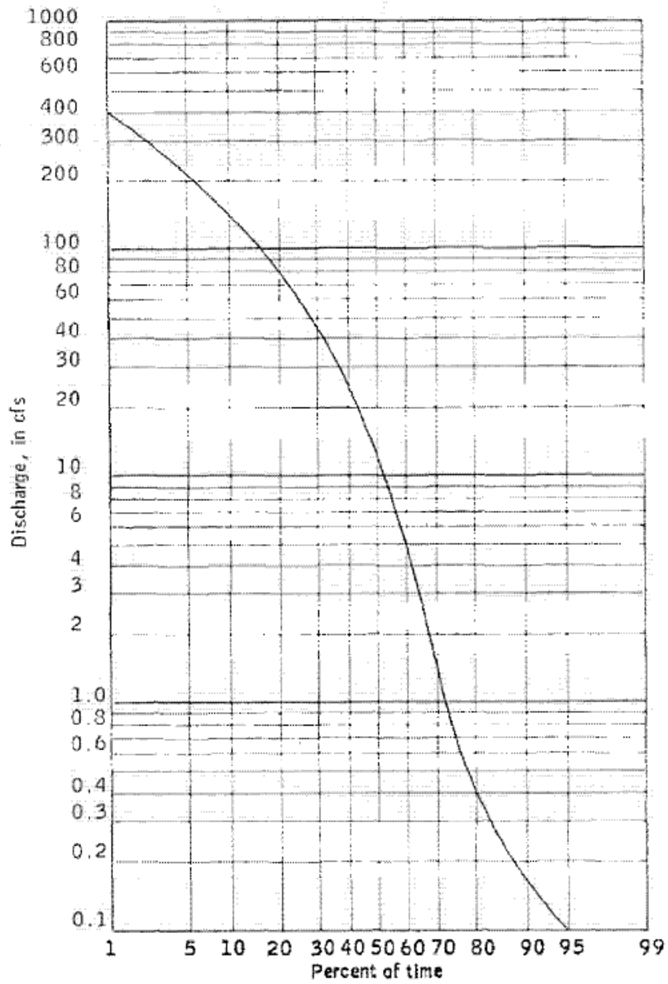



Figure 61. FLOW-DURATION CURVE FOR THE PERIOD 1946-56.

TAHUYA RIVER NEAR BELFAIR

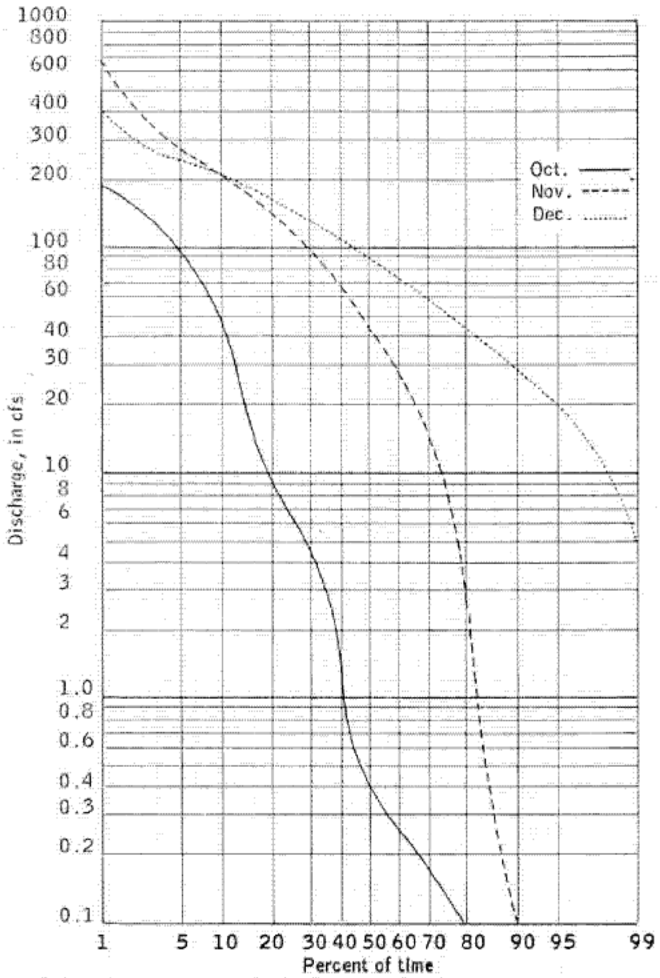



Figure 62a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1946-56.

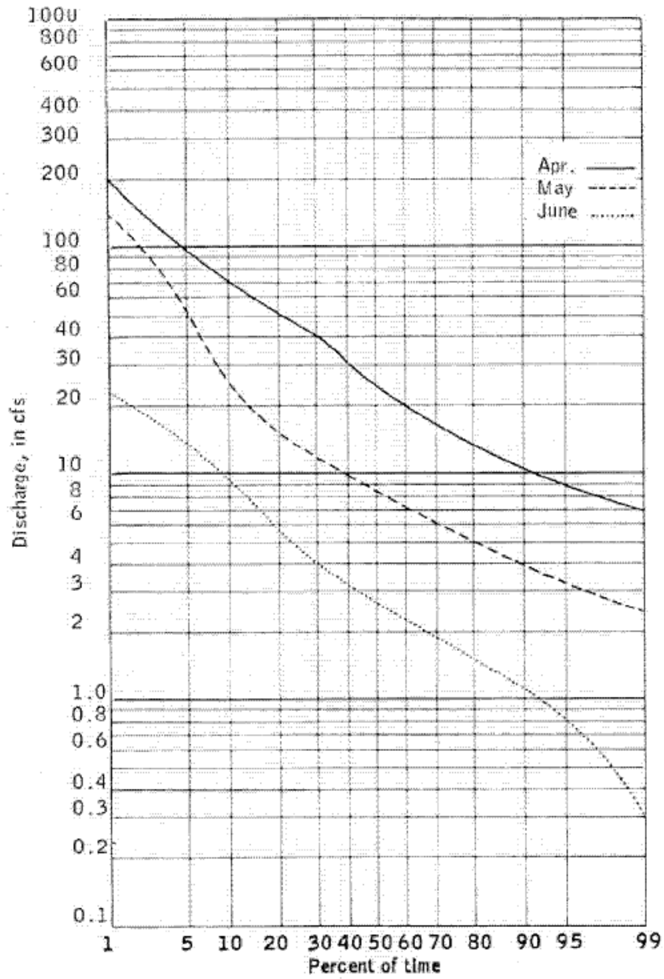



Figure 62b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1946-56.

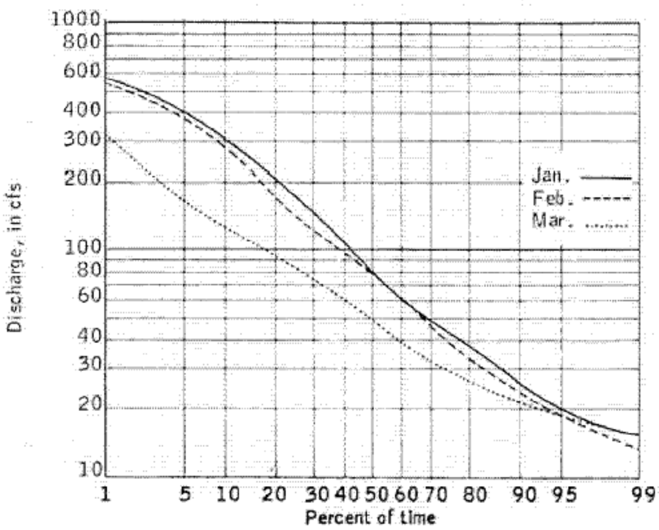



Figure 62c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1946-56.

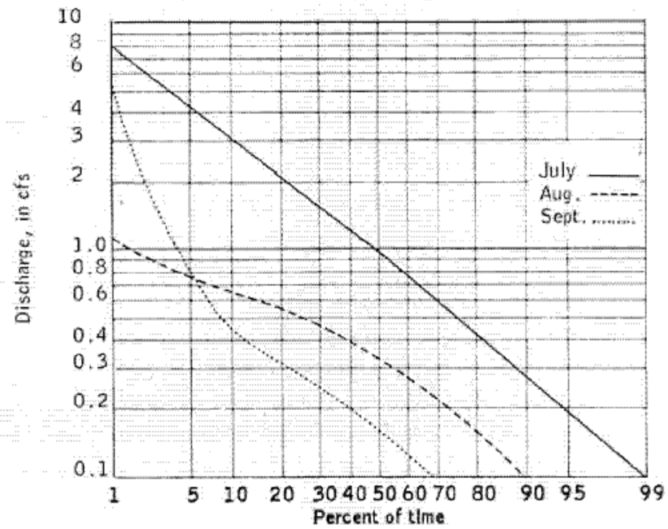



Figure 62d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1946-56.

DEWATTO CREEK NEAR DEWATTO

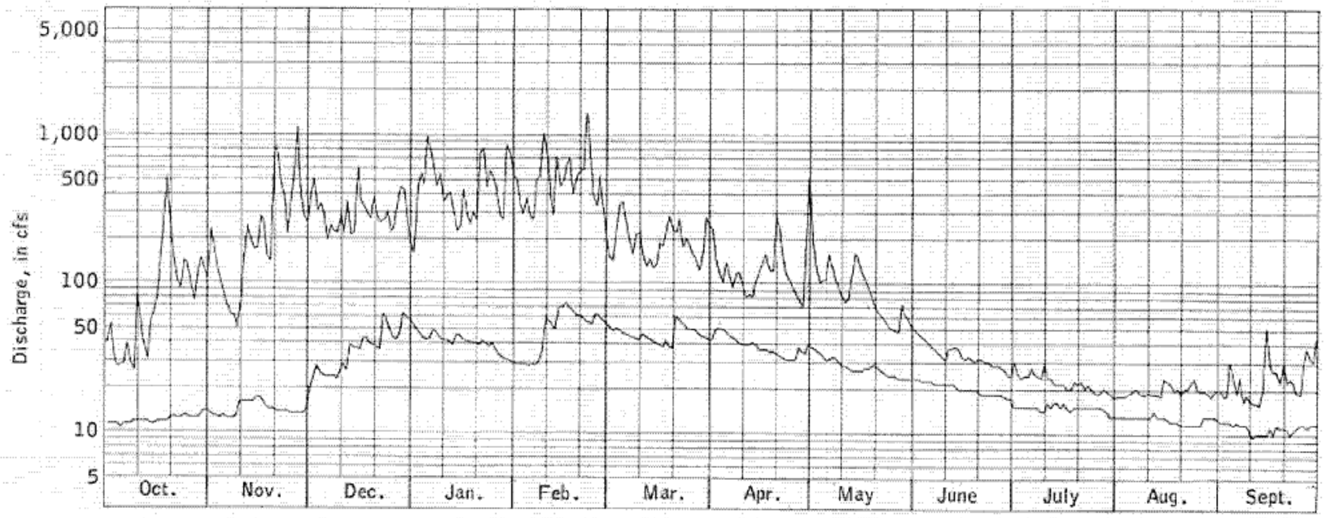



Figure 63. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1947-54, 1958-60.

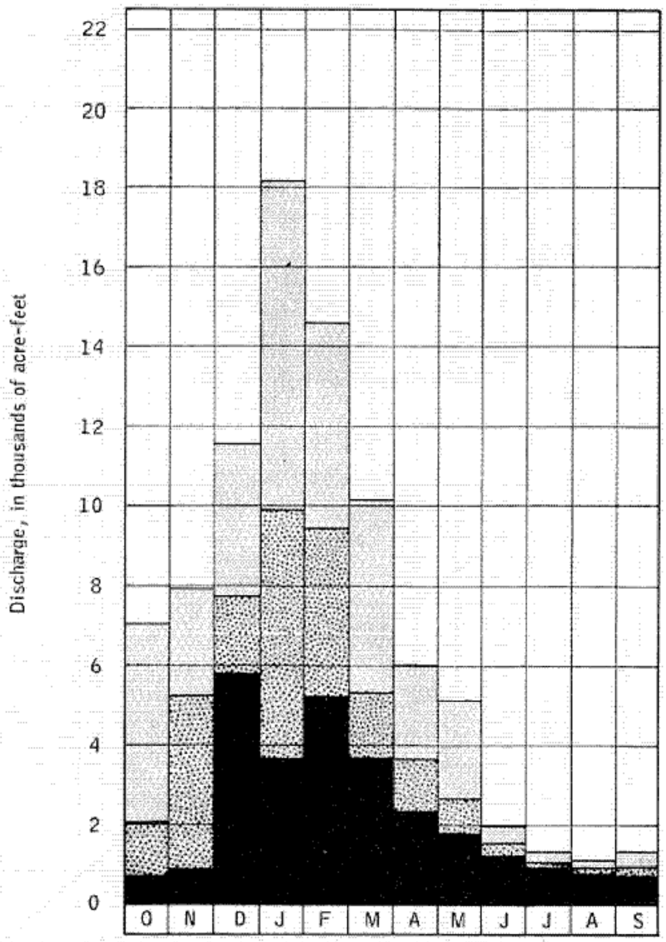



Figure 64. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1947-54, 1958-60.

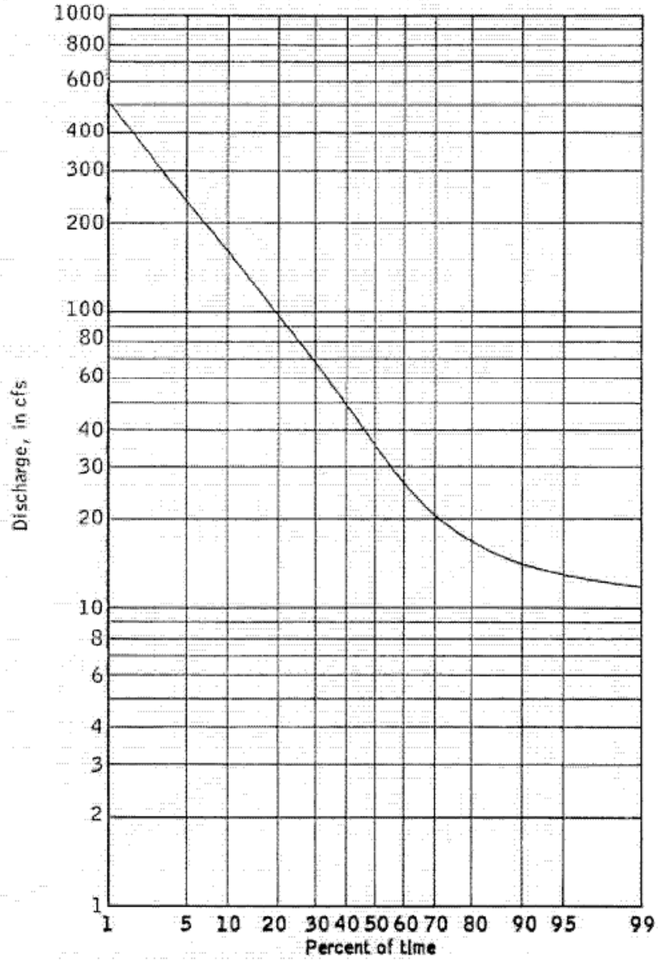



Figure 65. FLOW-DURATION CURVE FOR THE PERIOD 1948-54, 1959-60.

DEWATTO CREEK NEAR DEWATTO

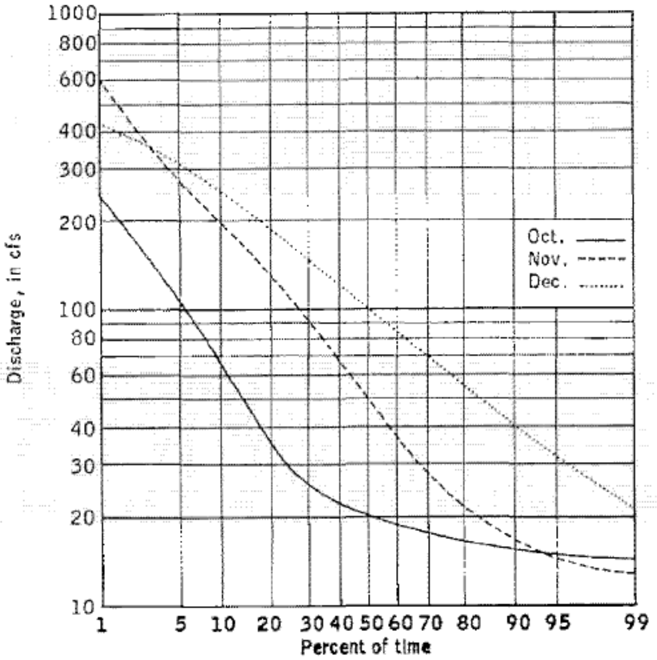



Figure 66a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1948-54, 1959-60.

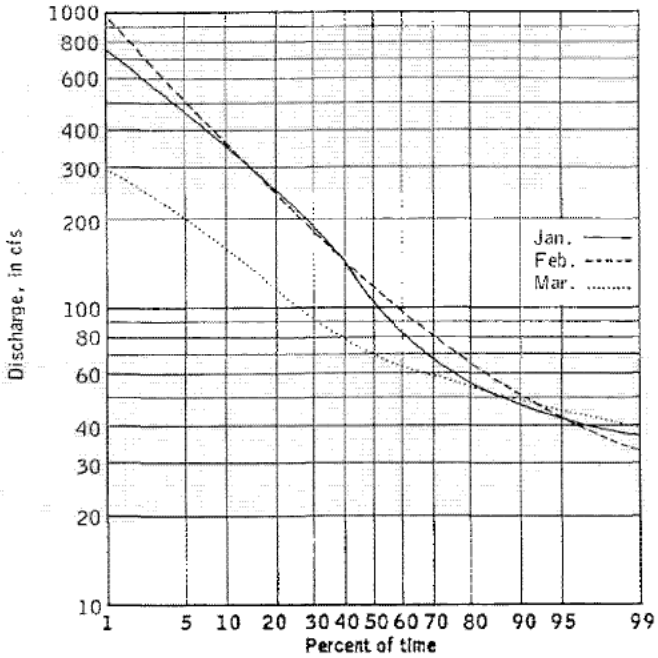



Figure 66b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1948-54, 1959-60.

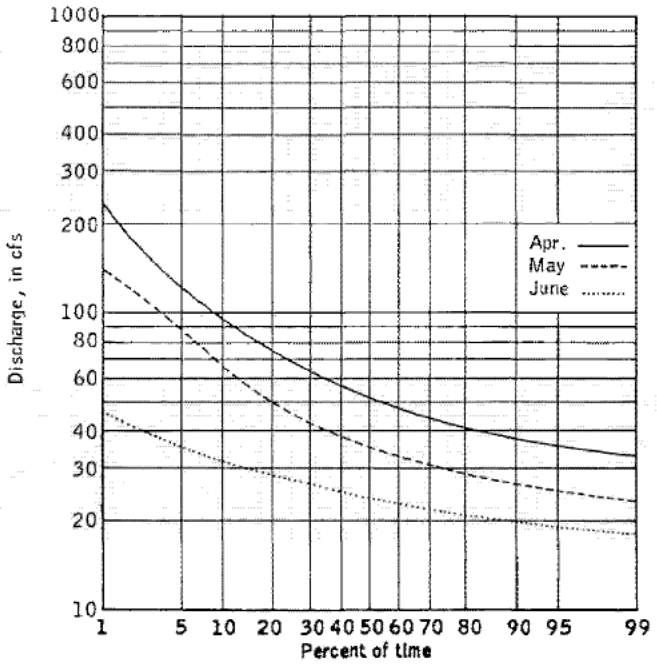



Figure 66c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1948-54, 1959-60.

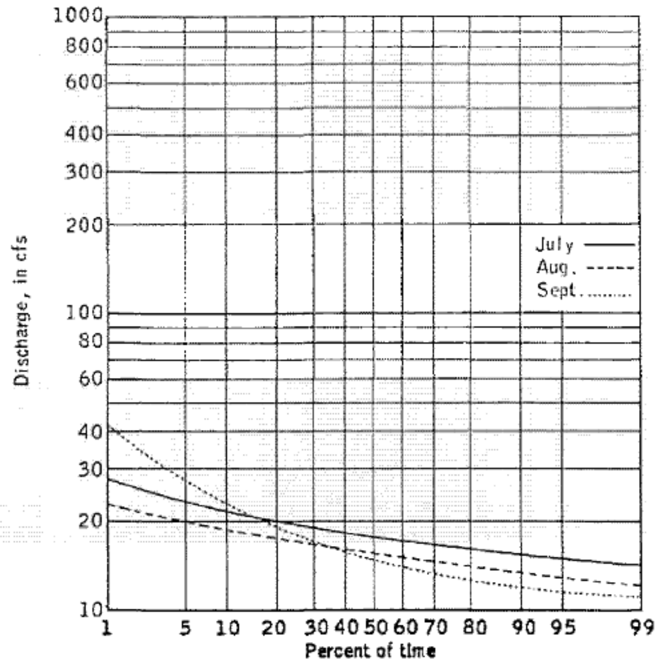



Figure 66d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1948-54, 1959-60.

DOGFISH CREEK NEAR POULSBO

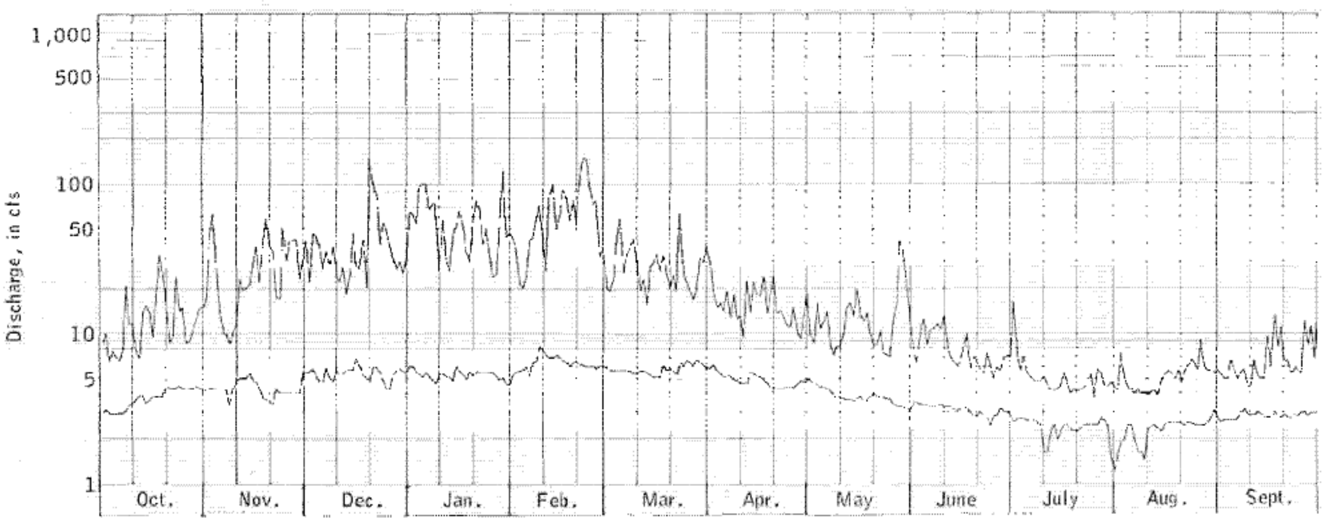



Figure 67. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1947-60.

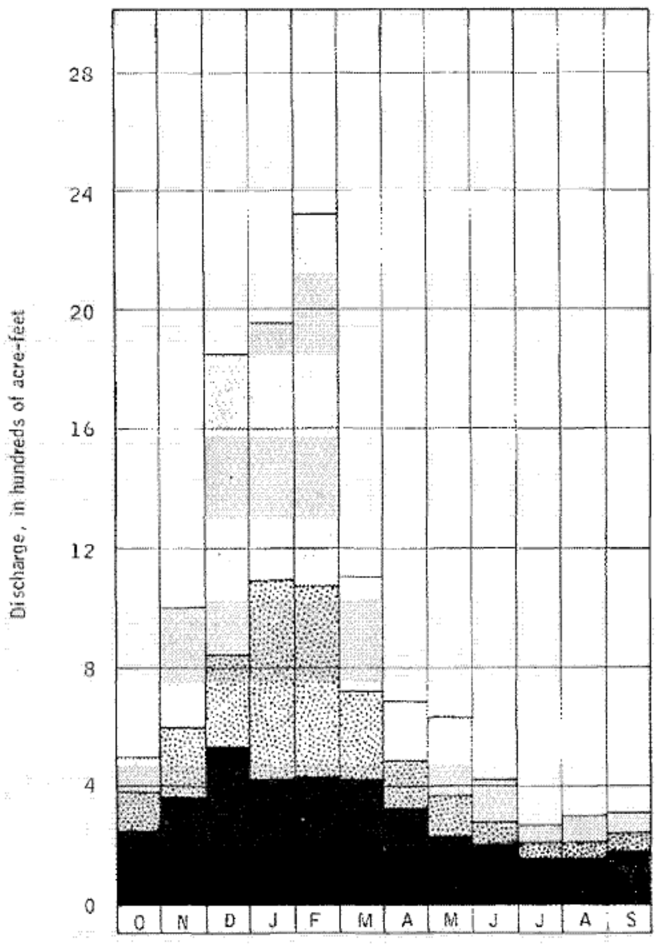



Figure 68. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1947-60.

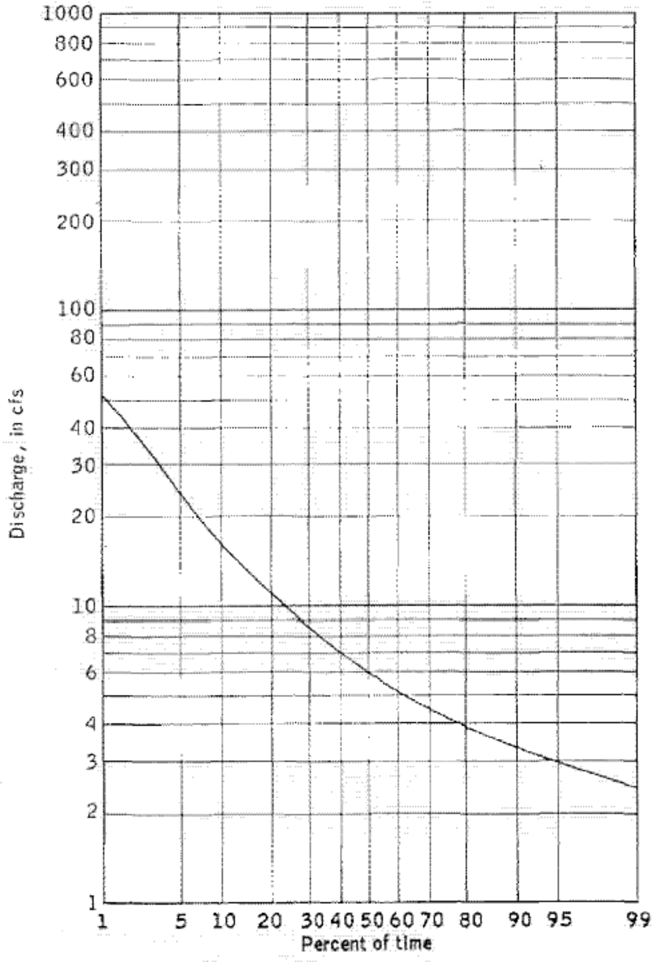



Figure 69. FLOW-DURATION CURVE FOR THE PERIOD 1948-60.

DOGFISH CREEK NEAR POULSBO

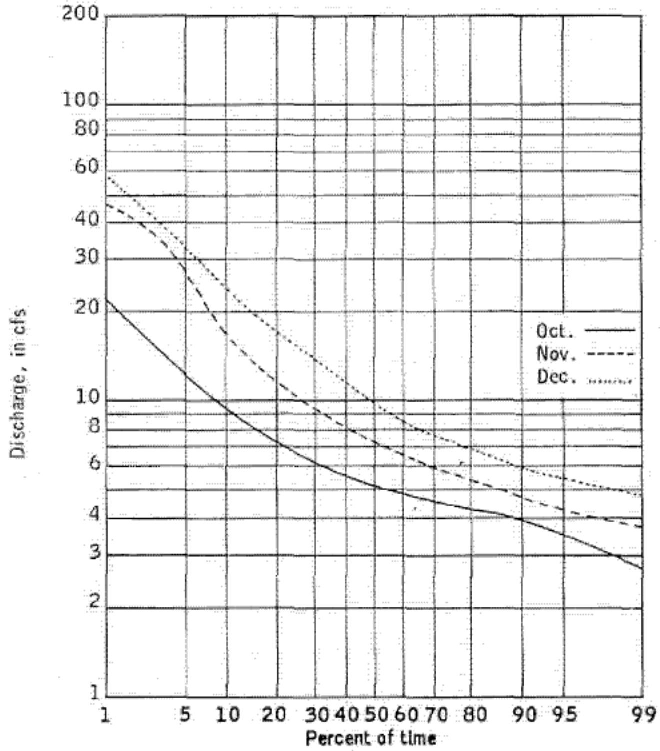



Figure 70a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1948-60.

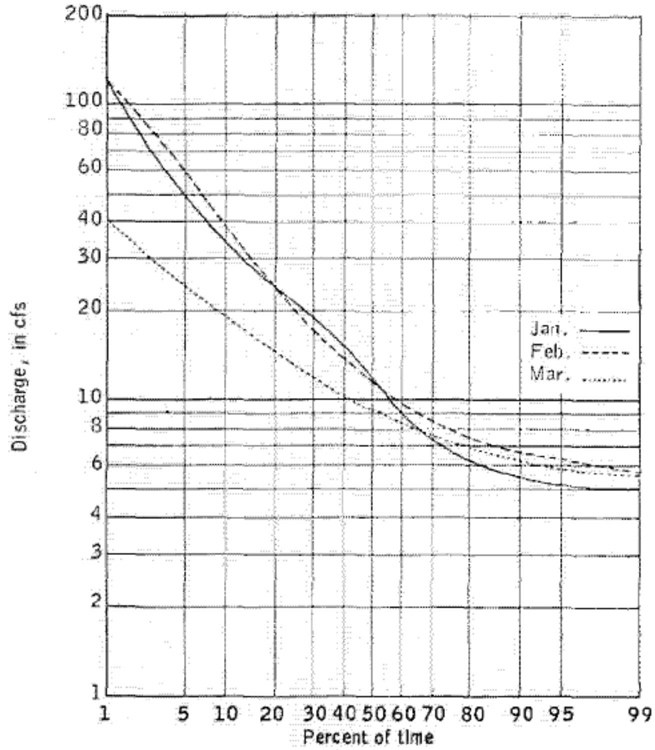



Figure 70b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1948-60.

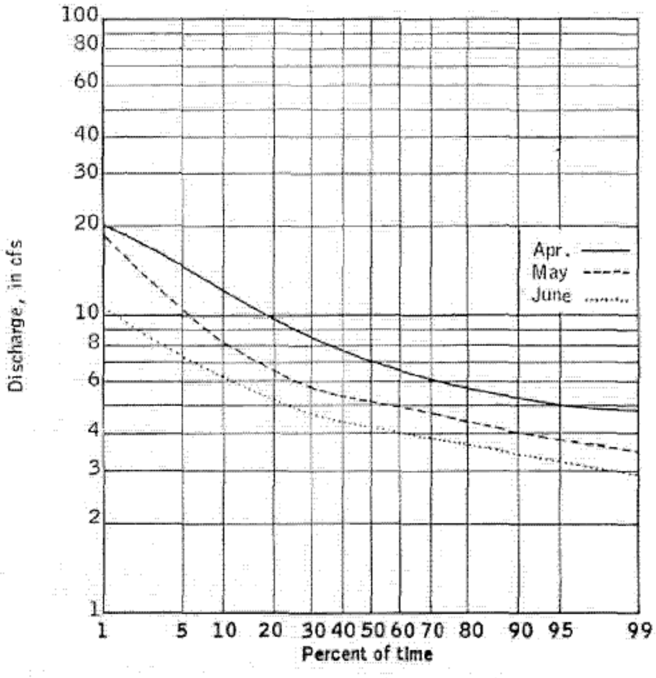



Figure 70c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1948-60.

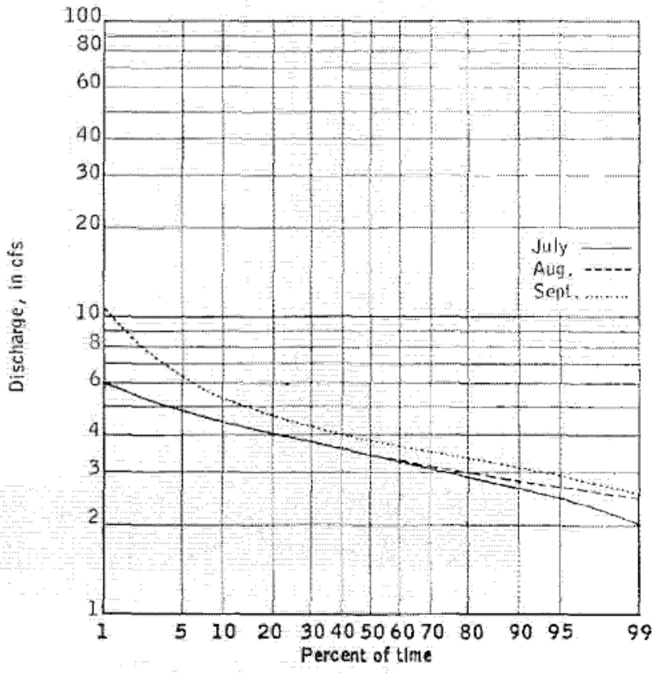



Figure 70d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1948-60.

HUGE CREEK NEAR WAUNA

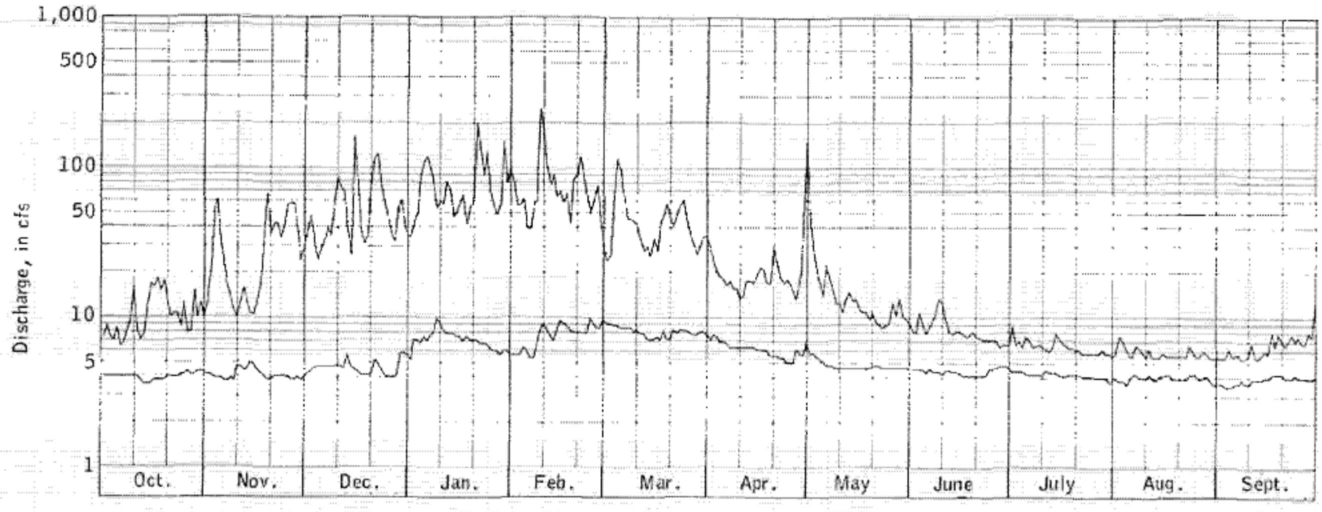



Figure 71. MAXIMUM-MINIMUM DISCHARGE HYDROGRAPHS FOR YEARS 1947-60.

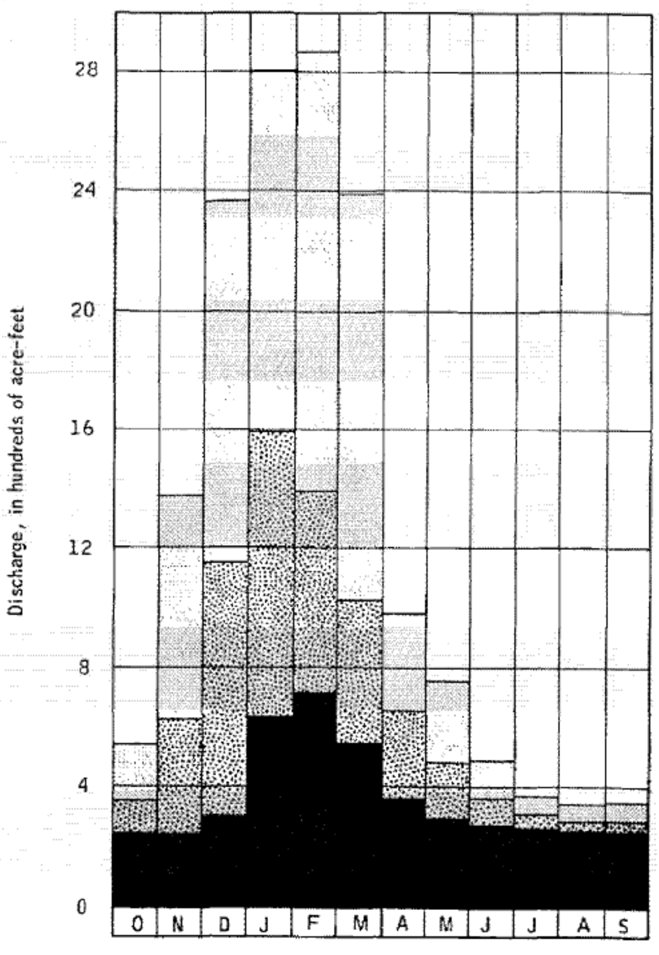



Figure 72. MAXIMUM, MINIMUM AND AVERAGE MONTHLY DISCHARGE FOR THE PERIOD 1947-60.

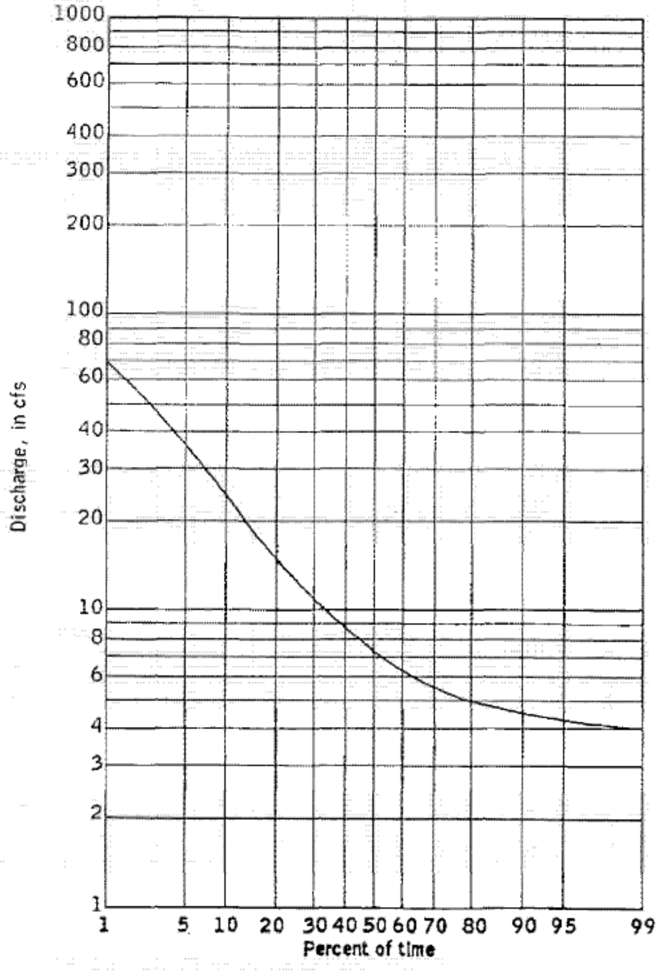



Figure 73. FLOW-DURATION CURVE FOR THE PERIOD 1948-60.

HUGE CREEK NEAR WAUNA

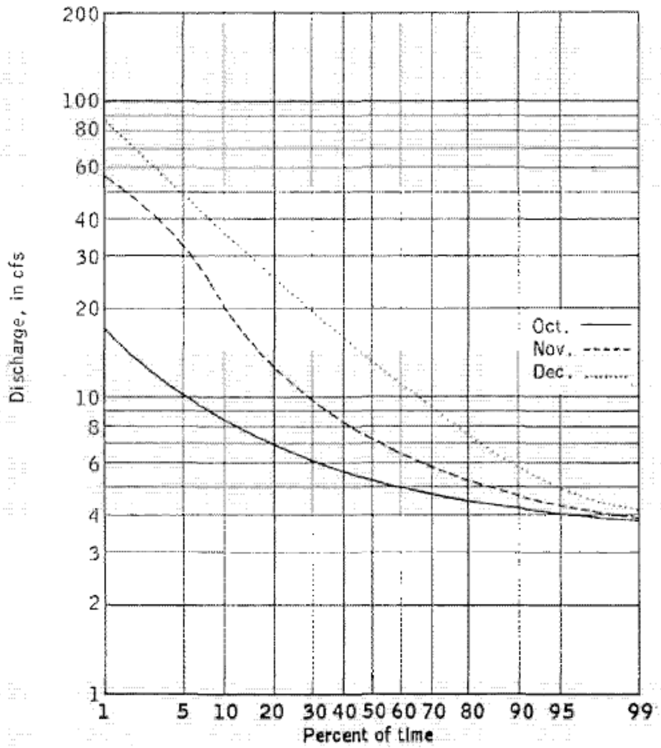



Figure 74a. FLOW-DURATION CURVES FOR OCTOBER, NOVEMBER, DECEMBER 1948-60.

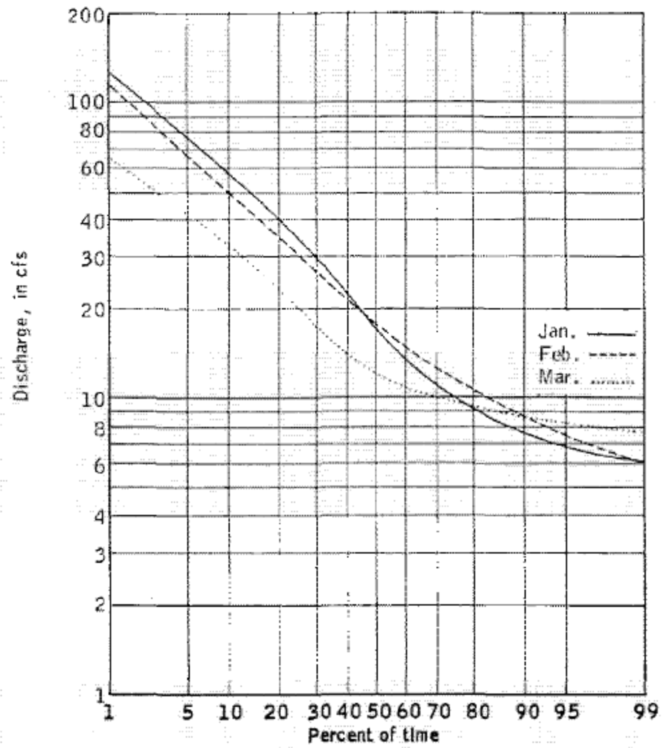



Figure 74b. FLOW-DURATION CURVES FOR JANUARY, FEBRUARY, MARCH 1948-60.

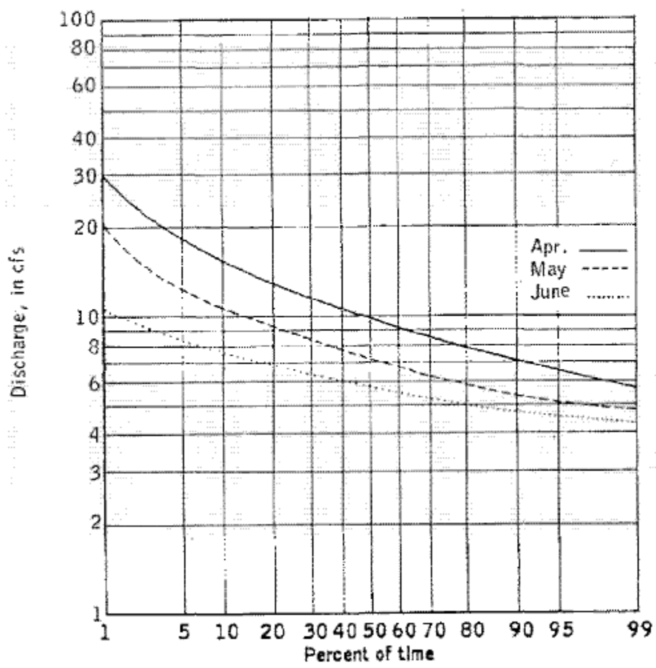



Figure 74c. FLOW-DURATION CURVES FOR APRIL, MAY, JUNE 1948-60.

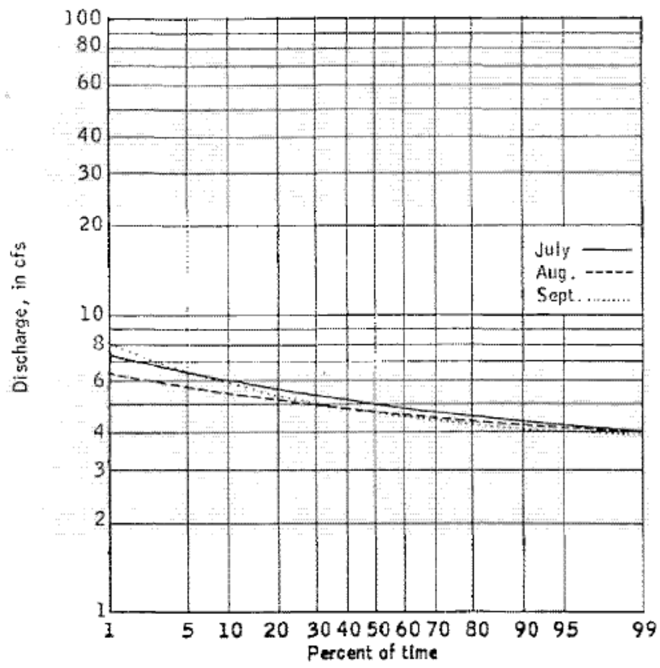



Figure 74d. FLOW-DURATION CURVES FOR JULY, AUGUST, SEPTEMBER 1948-60.

Table 12. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, UNION RIVER NEAR BREMERTON

Maximum daily discharge of Union River near Bremerton, for years 1946-59

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 22 | 44 | 79 | 74 | 120 | 44 | 26 | 42 | 12 | 11 | 15 | 11.5 |
| 2 | 19 | 100 | 91 | 97 | 142 | 43 | 36 | 45 | 13 | 13.5 | 14 | 12 |
| 3 | 15 | 279 | 56 | 169 | 75 | 46 | 33 | 34 | 12.5 | 15.5 | 13 | 12 |
| 4 | 12.5 | 200 | 61 | 120 | 100 | 82 | 30 | 22 | 12.5 | 13 | 11.5 | 16 |
| 5 | 11.5 | 50 | 56 | 151 | 60 | 88 | 29 | 20 | 13 | 11.5 | 11.5 | 16 |
| 6 | 11 | 35 | 61 | 129 | 46 | 62 | 25 | 35 | 13 | 14.5 | 12 | 16.5 |
| 7 | 8.8 | 25 | 60 | 120 | 55 | 42 | 23 | 31 | 10.5 | 16.5 | 12.5 | 17.5 |
| 8 | 12 | 21 | 48 | 116 | 158 | 31 | 20 | 23 | 11.5 | 14.5 | 12.5 | 19 |
| 9 | 18.5 | 19 | 52 | 104 | 269 | 34 | 18.5 | 18.5 | 11 | 15 | 12.5 | 19 |
| 10 | 15 | 16 | 55 | 63 | 151 | 40 | 23 | 17 | 11.5 | 16 | 12.5 | 19 |
| 11 | 9.0 | 23 | 46 | 120 | 83 | 30 | 115 | 16 | 11 | 16.5 | 12.5 | 19 |
| 12 | 8 | 56 | 72 | 110 | 52 | 24 | 92 | 16 | 9.8 | 14.5 | 12.5 | 19 |
| 13 | 7.2 | 55 | 45 | 74 | 112 | 22 | 57 | 20 | 10.5 | 13.5 | 12.5 | 19 |
| 14 | 7.2 | 46 | 40 | 54 | 140 | 24 | 39 | 23 | 9.3 | 16 | 12.5 | 19 |
| 15 | 13 | 33 | 44 | 64 | 110 | 35 | 29 | 23 | 9.7 | 17 | 12.5 | 19 |
| 16 | 19.5 | 56 | 40 | 98 | 95 | 34 | 23 | 21 | 12.5 | 17 | 12.5 | 19 |
| 17 | 47 | 63 | 58 | 66 | 135 | 32 | 33 | 18.5 | 16 | 17 | 12.5 | 19 |
| 18 | 112 | 191 | 46 | 56 | 67 | 45 | 27 | 16 | 16 | 17 | 13 | 19 |
| 19 | 132 | 218 | 39 | 71 | 137 | 56 | 20 | 16 | 16 | 14.5 | 13 | 20 |
| 20 | 57 | 80 | 75 | 139 | 108 | 46 | 17 | 12.5 | 14.5 | 15 | 13 | 28 |
| 21 | 32 | 62 | 160 | 282 | 114 | 40 | 14.5 | 12.5 | 13.5 | 16 | 12 | 21 |
| 22 | 24 | 54 | 73 | 198 | 280 | 71 | 13 | 13 | 13.5 | 17 | 11.5 | 22 |
| 23 | 19 | 94 | 69 | 84 | 88 | 97 | 12 | 14 | 14.5 | 17 | 11.5 | 22 |
| 24 | 27 | 80 | 74 | 99 | 62 | 42 | 11.5 | 13 | 12 | 17 | 11.5 | 22 |
| 25 | 30 | 114 | 56 | 164 | 55 | 35 | 10.5 | 12.5 | 12 | 17 | 12 | 22 |
| 26 | 21 | 167 | 50 | 107 | 84 | 30 | 10.5 | 13.5 | 11 | 16.5 | 11.5 | 22 |
| 27 | 17 | 222 | 47 | 76 | 68 | 27 | 10 | 16 | 9.8 | 14 | 12 | 22 |
| 28 | 28 | 66 | 118 | 62 | 60 | 24 | 9.6 | 14 | 10.5 | 16.5 | 12 | 22 |
| 29 | 40 | 56 | 87 | 61 | | 23 | 11.5 | 14 | 10.5 | 17 | 11.5 | 20 |
| 30 | 38 | 54 | 70 | 190 | - | 26 | 41 | 13.5 | 11.5 | 16 | 11.5 | 19.5 |
| 31 | 34 | - | 54 | 120 | - | 26 | - | 13.5 | - | 14.5 | 11.5 | - |

Minimum daily discharge of Union River near Bremerton, for years 1946-59

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.5 | 0.7 | 1.4 | 1.6 | 4.3 | 6.2 | 4.3 | 3.0 | 0.5 | 0.8 | 0.5 | 0.4 |
| 2 | 0.5 | 0.7 | 1.6 | 1.3 | 4.3 | 5.8 | 4.6 | 2.6 | 0.2 | 0.8 | 0.4 | 0.4 |
| 3 | 0.5 | 0.6 | 3.2 | 1.2 | 4.3 | 5.8 | 4.4 | 2.6 | 0.4 | 0.8 | 0.5 | 0.4 |
| 4 | 0.6 | 0.6 | 2.4 | 1.0 | 4.2 | 5.8 | 4.4 | 2.6 | 0.8 | 0.8 | 0.5 | 0.4 |
| 5 | 0.6 | 0.6 | 1.4 | 0.9 | 4.0 | 5.4 | 4.6 | 2.4 | 1.0 | 0.8 | 0.5 | 0.4 |
| 6 | 0.6 | 0.6 | 1.3 | 0.8 | 4.2 | 5.4 | 4.4 | 2.2 | 1.4 | 0.8 | 0.4 | 0.4 |
| 7 | 0.5 | 0.6 | 1.3 | 2.6 | 4.0 | 5.8 | 4.1 | 2.2 | 1.5 | 0.8 | 0.4 | 0.4 |
| 8 | 0.5 | 0.6 | 5.0 | 4.0 | 4.3 | 5.8 | 4.6 | 2.0 | 1.4 | 0.8 | 0.4 | 0.3 |
| 9 | 0.6 | 0.6 | 4.9 | 4.5 | 4.8 | 5.4 | 5.1 | 1.9 | 1.3 | 0.8 | 0.4 | 0.3 |
| 10 | 0.7 | 1.2 | 5.2 | 4.8 | 5.1 | 5.1 | 5.2 | 1.9 | 1.3 | 0.7 | 0.4 | 0.4 |
| 11 | 0.6 | 1.3 | 5.2 | 5.1 | 5.4 | 5.8 | 4.6 | 2.0 | 1.3 | 0.6 | 0.4 | 0.4 |
| 12 | 0.6 | 1.2 | 5.2 | 6.2 | 5.4 | 7.1 | 4.6 | 2.0 | 1.4 | 0.6 | 0.4 | 0.4 |
| 13 | 0.6 | 1.3 | 3.4 | 5.4 | 3.9 | 6.5 | 4.3 | 1.8 | 1.4 | 0.6 | 0.4 | 0.4 |
| 14 | 0.5 | 1.8 | 1.0 | 6.9 | 3.2 | 6.2 | 4.3 | 1.6 | 1.3 | 0.6 | 0.4 | 0.4 |
| 15 | 0.4 | 0.8 | 0.9 | 6.0 | 3.2 | 6.4 | 4.0 | 1.5 | 1.2 | 0.6 | 0.4 | 0.4 |
| 16 | 0.5 | 1.2 | 0.9 | 5.6 | 3.2 | 6.2 | 3.8 | 1.4 | 1.2 | 0.6 | 0.4 | 0.4 |
| 17 | 0.5 | 1.0 | 1.3 | 5.2 | 3.2 | 5.8 | 4.2 | 1.4 | 1.1 | 0.6 | 0.4 | 0.4 |
| 18 | 0.5 | 0.9 | 1.3 | 5.2 | 2.8 | 6.5 | 3.8 | 1.3 | 1.0 | 0.6 | 0.4 | 0.4 |
| 19 | 0.5 | 0.9 | 2.0 | 4.8 | 0.9 | 6.0 | 3.6 | 1.2 | 1.0 | 0.6 | 0.4 | 0.4 |
| 20 | 0.6 | 1.2 | 1.4 | 4.8 | 0.8 | 5.8 | 3.4 | 1.1 | 0.9 | 0.6 | 0.4 | 0.4 |
| 21 | 0.6 | 1.4 | 2.8 | 4.5 | 2.6 | 7.0 | 3.2 | 1.0 | 0.9 | 0.5 | 0.3 | 0.3 |
| 22 | 0.6 | 1.3 | 2.8 | 4.9 | 4.2 | 6.8 | 2.7 | 0.8 | 0.9 | 0.5 | 0.4 | 0.3 |
| 23 | 0.6 | 1.0 | 3.0 | 5.9 | 6.0 | 6.6 | 2.9 | 0.7 | 0.9 | 0.5 | 0.4 | 0.4 |
| 24 | 0.6 | 0.9 | 4.2 | 6.3 | 5.6 | 5.8 | 3.6 | 0.6 | 1.0 | 0.5 | 0.4 | 0.4 |
| 25 | 0.6 | 0.8 | 4.8 | 5.4 | 6.0 | 5.7 | 3.0 | 0.6 | 0.9 | 0.6 | 0.4 | 0.4 |
| 26 | 0.6 | 0.8 | 5.4 | 5.4 | 6.2 | 5.3 | 2.9 | 0.5 | 0.9 | 0.6 | 0.4 | 0.5 |
| 27 | 0.6 | 0.8 | 4.2 | 5.0 | 5.8 | 5.1 | 3.1 | 0.3 | 0.9 | 0.5 | 0.4 | 0.5 |
| 28 | 0.6 | 0.6 | 3.9 | 4.8 | 6.2 | 4.9 | 3.0 | 0.4 | 0.8 | 0.5 | 0.4 | 0.5 |
| 29 | 0.6 | 0.6 | 3.2 | 4.7 | | 4.8 | 3.2 | 0.6 | 0.8 | 0.5 | 0.4 | 0.5 |
| 30 | 0.7 | 0.6 | 2.4 | 4.7 | - | 4.8 | 3.0 | 0.6 | 0.8 | 0.5 | 0.4 | 0.5 |
| 31 | 0.8 | - | 2.2 | 4.5 | - | 4.6 | - | 0.6 | - | 0.5 | 0.4 | - |

Table 13. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, UNION RIVER NEAR BELFAIR

Maximum daily discharge of Union River near Belfair, for years 1947-59

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 38 | 135 | 261 | 289 | 314 | 141 | 113 | 185 | 39 | 38 | 24 | 24 |
| 2 | 45 | 184 | 356 | 343 | 219 | 126 | 110 | 146 | 36 | 30 | 32 | 24 |
| 3 | 32 | 903 | 175 | 438 | 209 | 210 | 100 | 121 | 43 | 29 | 28 | 24 |
| 4 | 28 | 632 | 183 | 373 | 296 | 306 | 80 | 81 | 43 | 29 | 27 | 26 |
| 5 | 26 | 211 | 144 | 545 | 199 | 306 | 87 | 69 | 37 | 32 | 24 | 23 |
| 6 | 29 | 132 | 181 | 492 | 148 | 199 | 71 | 119 | 41 | 30 | 25 | 23 |
| 7 | 32 | 89 | 183 | 336 | 223 | 140 | 73 | 94 | 48 | 29 | 28 | 26 |
| 8 | 62 | 67 | 159 | 416 | 425 | 144 | 77 | 75 | 56 | 29 | 27 | 24 |
| 9 | 69 | 55 | 461 | 417 | 948 | 153 | 79 | 62 | 58 | 29 | 26 | 24 |
| 10 | 70 | 59 | 266 | 215 | 589 | 138 | 65 | 60 | 56 | 33 | 26 | 24 |
| 11 | 44 | 95 | 165 | 425 | 346 | 116 | 67 | 54 | 47 | 28 | 25 | 24 |
| 12 | 43 | 166 | 252 | 420 | 223 | 105 | 124 | 64 | 39 | 28 | 24 | 24 |
| 13 | 36 | 144 | 126 | 261 | 376 | 123 | 130 | 77 | 37 | 27 | 25 | 24 |
| 14 | 35 | 120 | 126 | 183 | 252 | 118 | 106 | 84 | 37 | 28 | 25 | 23 |
| 15 | 54 | 72 | 130 | 237 | 306 | 159 | 96 | 76 | 37 | 27 | 30 | 39 |
| 16 | 59 | 184 | 157 | 367 | 358 | 144 | 104 | 70 | 36 | 27 | 24 | 26 |
| 17 | 126 | 140 | 214 | 234 | 809 | 140 | 101 | 66 | 38 | 26 | 23 | 32 |
| 18 | 258 | 464 | 155 | 225 | 248 | 160 | 83 | 55 | 35 | 26 | 24 | 28 |
| 19 | 585 | 538 | 141 | 267 | 465 | 185 | 85 | 51 | 36 | 26 | 26 | 55 |
| 20 | 182 | 252 | 285 | 259 | 381 | 151 | 80 | 48 | 34 | 26 | 23 | 72 |
| 21 | 90 | 149 | 465 | 894 | 437 | 174 | 62 | 44 | 33 | 29 | 24 | 48 |
| 22 | 66 | 155 | 422 | 693 | 1,270 | 284 | 57 | 45 | 32 | 25 | 23 | 34 |
| 23 | 76 | 127 | 258 | 342 | 648 | 400 | 55 | 39 | 32 | 25 | 24 | 27 |
| 24 | 90 | 255 | 249 | 369 | 306 | 275 | 52 | 38 | 32 | 25 | 24 | 25 |
| 25 | 157 | 303 | 250 | 413 | 290 | 198 | 52 | 36 | 32 | 24 | 23 | 26 |
| 26 | 124 | 367 | 200 | 364 | 335 | 152 | 49 | 39 | 31 | 33 | 24 | 32 |
| 27 | 96 | 637 | 180 | 214 | 174 | 118 | 49 | 39 | 31 | 33 | 24 | 35 |
| 28 | 86 | 256 | 332 | 217 | 150 | 115 | 69 | 59 | 30 | 27 | 23 | 38 |
| 29 | 122 | 150 | 232 | 203 | | 120 | 190 | 53 | 36 | 26 | 24 | 32 |
| 30 | 110 | 155 | 137 | 391 | - | 153 | 349 | 47 | 30 | 26 | 25 | 28 |
| 31 | 84 | - | 120 | 304 | - | 146 | - | 41 | - | 26 | 24 | - |

Minimum daily discharge of Union River near Belfair, for years 1947-59

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 17.5 | 16 | 38 | 27 | 37 | 36 | 34 | 24 | 20 | 16.5 | 14.5 |
| 2 | 15.5 | 17.5 | 16 | 37 | 27 | 36 | 41 | 32 | 24 | 20 | 16.5 | 14.5 |
| 3 | 15.5 | 17.5 | 17 | 36 | 27 | 38 | 39 | 32 | 24 | 20 | 16 | 14.5 |
| 4 | 16 | 17.5 | 18 | 37 | 27 | 34 | 37 | 30 | 24 | 20 | 15.5 | 14.5 |
| 5 | 16 | 18 | 22 | 36 | 27 | 33 | 36 | 30 | 24 | 19 | 16 | 14 |
| 6 | 16 | 18 | 22 | 36 | 27 | 33 | 36 | 29 | 23 | 19 | 16.5 | 14 |
| 7 | 15.5 | 17.5 | 22 | 40 | 27 | 33 | 35 | 28 | 22 | 19 | 16 | 14 |
| 8 | 16 | 17.5 | 21 | 40 | 28 | 34 | 34 | 28 | 21 | 19 | 16 | 14 |
| 9 | 16.5 | 17.5 | 21 | 38 | 33 | 35 | 33 | 28 | 21 | 18 | 15.5 | 14 |
| 10 | 20 | 19 | 23 | 42 | 46 | 36 | 33 | 28 | 21 | 18 | 15 | 14.5 |
| 11 | 21 | 19.5 | 25 | 39 | 43 | 37 | 33 | 28 | 22 | 18 | 15 | 15 |
| 12 | 19.5 | 17.5 | 22 | 38 | 39 | 35 | 33 | 27 | 22 | 19 | 15 | 15 |
| 13 | 19 | 19.5 | 28 | 37 | 38 | 35 | 34 | 27 | 22 | 18 | 15 | 15 |
| 14 | 19 | 19.5 | 28 | 34 | 41 | 34 | 33 | 28 | 22 | 18 | 15 | 15 |
| 15 | 18 | 21 | 26 | 32 | 39 | 33 | 32 | 28 | 21 | 17.5 | 15.5 | 15 |
| 16 | 18 | 18 | 26 | 31 | 38 | 33 | 32 | 28 | 22 | 18 | 15 | 15 |
| 17 | 17.5 | 17 | 29 | 31 | 36 | 32 | 32 | 27 | 21 | 18 | 15 | 14.5 |
| 18 | 17.5 | 15.5 | 27 | 31 | 35 | 36 | 32 | 26 | 20 | 18 | 15 | 14.5 |
| 19 | 17 | 15.5 | 25 | 30 | 34 | 34 | 32 | 27 | 20 | 18 | 15.5 | 15 |
| 20 | 17.5 | 15.5 | 23 | 29 | 34 | 33 | 32 | 28 | 21 | 18 | 15 | 15 |
| 21 | 17.5 | 15.5 | 33 | 30 | 34 | 38 | 31 | 28 | 22 | 18 | 15 | 15 |
| 22 | 17.5 | 16 | 36 | 29 | 34 | 40 | 30 | 26 | 22 | 18 | 15 | 15 |
| 23 | 17.5 | 16.5 | 30 | 28 | 34 | 36 | 30 | 25 | 23 | 17 | 14.5 | 15 |
| 24 | 17.5 | 16 | 28 | 27 | 39 | 35 | 30 | 25 | 21 | 18 | 14.5 | 15 |
| 25 | 17.5 | 16.5 | 26 | 27 | 36 | 34 | 31 | 24 | 21 | 17.5 | 14 | 15 |
| 26 | 17.5 | 16 | 24 | 27 | 35 | 33 | 31 | 23 | 21 | 17 | 14 | 15 |
| 27 | 18.5 | 16.5 | 24 | 27 | 34 | 33 | 37 | 22 | 22 | 17 | 15 | 15 |
| 28 | 18 | 16 | 28 | 27 | 37 | 36 | 32 | 22 | 23 | 16.5 | 15 | 15 |
| 29 | 17.5 | 16 | 42 | 27 | | 37 | 28 | 23 | 23 | 16.5 | 15 | 15 |
| 30 | 18 | 16 | 41 | 27 | - | 38 | 36 | 22 | 22 | 16.5 | 14.5 | 15 |
| 31 | 18 | - | 40 | 27 | - | 39 | - | 23 | - | 16.5 | 14.5 | - |

Table 14. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, MISSION CREEK NEAR BREMERTON

Maximum daily discharge of Mission Creek near Bremerton, for years 1945-53

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | 11.5 | 50 | 30 | 68 | 28 | 10.5 | 7.1 | 6.0 | 1.5 | 0.4 | 0.3 |
| 2 | 0.9 | 13 | 52 | 37 | 56 | 28 | 9.3 | 6.9 | 5.7 | 1.4 | 0.4 | 0.3 |
| 3 | 0.9 | 13.5 | 49 | 48 | 47 | 26 | 8.6 | 6.7 | 5.4 | 1.3 | 0.4 | 0.3 |
| 4 | 1.0 | 12.5 | 46 | 43 | 48 | 31 | 8.0 | 7.3 | 5.2 | 1.2 | 0.3 | 0.3 |
| 5 | 0.9 | 11.5 | 43 | 36 | 43 | 39 | 7.5 | 8.4 | 4.9 | 1.2 | 0.3 | 0.3 |
| 6 | | | | | | | | | | | | |
| 6 | 1.0 | 10 | 38 | 32 | 37 | 37 | 7.1 | 11.5 | 4.7 | 1.1 | 0.4 | 0.3 |
| 7 | 1.1 | 9.2 | 34 | 32 | 33 | 30 | 6.7 | 13.5 | 4.5 | 1.0 | 0.4 | 0.3 |
| 8 | 1.0 | 8.4 | 30 | 46 | 40 | 25 | 6.6 | 14 | 4.2 | 1.2 | 0.3 | 0.2 |
| 9 | 1.5 | 7.7 | 27 | 62 | 84 | 21 | 6.6 | 13 | 4.0 | 1.2 | 0.3 | 0.2 |
| 10 | 2.8 | 7.2 | 30 | 42 | 81 | 17.5 | 7.6 | 12.5 | 3.7 | 1.2 | 0.3 | 0.2 |
| 11 | 2.5 | 6.8 | 28 | 44 | 58 | 14.5 | 20 | 11.5 | 3.7 | 1.1 | 0.3 | 0.2 |
| 12 | 2.3 | 13 | 24 | 54 | 41 | 12.5 | 30 | 11.5 | 3.7 | 1.0 | 0.3 | 0.2 |
| 13 | 2.1 | 13.5 | 20 | 50 | 40 | 12 | 31 | 13 | 3.6 | 1.0 | 0.3 | 0.2 |
| 14 | 1.9 | 12 | 18 | 40 | 46 | 12 | 29 | 14 | 3.5 | 0.9 | 0.3 | 0.2 |
| 15 | 1.7 | 17 | 18 | 35 | 49 | 13 | 27 | 14.5 | 3.3 | 0.9 | 0.4 | 0.6 |
| 16 | 1.6 | 15 | 20 | 47 | 49 | 15 | 23 | 14.5 | 3.1 | 0.8 | 0.4 | 0.6 |
| 17 | 2.5 | 21 | 26 | 42 | 39 | 15 | 20 | 13.5 | 3.0 | 0.8 | 0.4 | 0.6 |
| 18 | 5.4 | 21 | 25 | 39 | 40 | 17.5 | 18 | 12.5 | 2.9 | 0.8 | 0.3 | 0.6 |
| 19 | 21 | 19 | 24 | 40 | 34 | 23 | 16 | 11 | 2.8 | 0.7 | 0.3 | 0.5 |
| 20 | 24 | 22 | 25 | 37 | 29 | 24 | 14 | 10.5 | 2.8 | 0.7 | 0.3 | 0.5 |
| 21 | 20 | 32 | 30 | 64 | 40 | 23 | 13 | 9.5 | 2.7 | 0.6 | 0.3 | 0.6 |
| 22 | 16.5 | 33 | 30 | 84 | 90 | 22 | 11 | 8.6 | 2.6 | 0.6 | 0.3 | 0.6 |
| 23 | 14 | 30 | 32 | 62 | 80 | 21 | 10 | 7.9 | 2.4 | 0.6 | 0.3 | 0.6 |
| 24 | 12 | 30 | 36 | 42 | 57 | 21 | 9.1 | 7.4 | 2.3 | 0.6 | 0.3 | 0.6 |
| 25 | 9.9 | 36 | 33 | 45 | 42 | 19 | 8.4 | 6.9 | 2.2 | 0.6 | 0.3 | 0.5 |
| 26 | 8.8 | 42 | 28 | 52 | 34 | 18 | 7.4 | 6.4 | 2.1 | 0.5 | 0.3 | 0.6 |
| 27 | 7.9 | 81 | 24 | 41 | 32 | 17 | 6.7 | 6.0 | 2.0 | 0.5 | 0.3 | 0.8 |
| 28 | 8 | 56 | 22 | 39 | 29 | 14.5 | 6.4 | 6.6 | 1.9 | 0.5 | 0.3 | 1.0 |
| 29 | 10 | 38 | 40 | 38 | | 13.5 | 6.4 | 6.8 | 1.8 | 0.5 | 0.3 | 1.0 |
| 30 | 12.5 | 37 | 35 | 53 | - | 12.5 | 6.7 | 6.6 | 1.7 | 0.5 | 0.4 | 1.0 |
| 31 | 11.5 | - | 33 | 67 | - | 11 | - | 6.3 | - | 0.4 | 0.3 | - |

Minimum daily discharge of Mission Creek near Bremerton, for years 1945-53

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 4.5 | 3.4 | 3.8 | 4.2 | 2.2 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 4.0 | 3.4 | 3.4 | 3.9 | 1.8 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 3.8 | 3.3 | 3.8 | 3.7 | 1.2 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 1.9 | 4.0 | 3.2 | 3.4 | 3.7 | 1.2 | 0.1 | 0 | 0 | 0 |
| 5 | 0 | 0 | 3.3 | 4.2 | 3.0 | 3.6 | 3.5 | 0.8 | 0.1 | 0 | 0 | 0 |
| 6 | 0 | 0 | 3.2 | 4.1 | 2.8 | 3.9 | 3.4 | 0.8 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 3.1 | 4.0 | 2.9 | 3.7 | 3.3 | 1.0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 3.1 | 3.9 | 3.4 | 3.7 | 3.3 | 1.0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 3.0 | 3.8 | 3.6 | 3.7 | 3.3 | 1.0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 3.1 | 4.2 | 4.3 | 3.7 | 3.3 | 1.0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 3.2 | 4.4 | 4.2 | 4.3 | 3.3 | 1.2 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 3.2 | 4.5 | 4.2 | 4.7 | 2.7 | 1.2 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 3.7 | 4.4 | 4.2 | 4.9 | 2.3 | 1.0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 4.0 | 4.3 | 4.9 | 4.9 | 2.1 | 0.8 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 4.1 | 4.2 | 5.8 | 4.9 | 2.1 | 0.8 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 4.2 | 4.2 | 7.5 | 4.5 | 1.9 | 0.8 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 4.2 | 4.1 | 6.9 | 4.8 | 1.9 | 0.8 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 7.2 | 4.3 | 6.2 | 4.7 | 1.8 | 0.8 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 6.8 | 4.4 | 5.8 | 4.6 | 1.9 | 0.2 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 6.3 | 4.4 | 5.4 | 4.4 | 1.9 | 0.2 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 6.6 | 4.6 | 4.9 | 4.7 | 1.8 | 0 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 6.8 | 5.1 | 4.7 | 4.3 | 1.2 | 0 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 7.0 | 5.1 | 4.5 | 4.1 | 1.0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 6.6 | 5.0 | 4.1 | 4.1 | 0.8 | 0.2 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 6.3 | 4.9 | 5.0 | 4.1 | 0.8 | 0.2 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 6.0 | 4.5 | 5.0 | 4.0 | 0.8 | 0.2 | 0 | 0 | 0 | 0 |
| 27 | 0 | 0 | 6.1 | 4.2 | 4.5 | 4.1 | 1.9 | 0.2 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 5.8 | 4.0 | 4.3 | 4.1 | 2.0 | 0.2 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 5.5 | 3.9 | | 4.1 | 2.3 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 5.2 | 3.5 | - | 4.3 | 2.1 | 0 | 0 | 0 | 0 | 0 |
| 31 | 0 | - | 5.0 | 3.4 | - | 4.2 | - | 0 | - | 0 | 0 | - |

Table 15. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, MISSION CREEK NEAR BELFAIR

Maximum daily discharge of Mission Creek near Belfair, for years 1946-53

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.6 | 28 | 69 | 64 | 112 | 54 | 17 | 8.5 | 9.0 | 1.3 | 0.8 | 0.5 |
| 2 | 0.8 | 31 | 106 | 91 | 93 | 56 | 16 | 8.7 | 8.5 | 1.1 | 0.8 | 0.6 |
| 3 | 0.6 | 29 | 76 | 105 | 81 | 48 | 14 | 13.5 | 8.0 | 1.1 | 0.7 | 0.6 |
| 4 | 0.6 | 26 | 68 | 95 | 85 | 41 | 13 | 15.5 | 7.5 | 1.1 | 0.7 | 0.6 |
| 5 | 0.6 | 23 | 66 | 80 | 72 | 85 | 12 | 16.5 | 7.0 | 1.1 | 0.6 | 0.5 |
| 6 | 0.8 | 20 | 84 | 65 | 57 | 80 | 11.5 | 24 | 6.5 | 1.1 | 0.6 | 0.5 |
| 7 | 0.7 | 18.5 | 75 | 73 | 54 | 61 | 11.5 | 26 | 6.0 | 1.0 | 0.6 | 0.5 |
| 8 | 0.6 | 16.5 | 58 | 124 | 102 | 49 | 11 | 25 | 5.5 | 1.1 | 0.6 | 0.5 |
| 9 | 0.6 | 15 | 54 | 149 | 257 | 42 | 12 | 22 | 5.0 | 0.9 | 0.6 | 0.5 |
| 10 | 0.8 | 15 | 66 | 125 | 212 | 36 | 16 | 22 | 5.0 | 0.9 | 0.6 | 0.4 |
| 11 | 1.0 | 19 | 58 | 124 | 137 | 30 | 59 | 20 | 5.0 | 0.9 | 0.6 | 0.5 |
| 12 | 1.4 | 31 | 48 | 137 | 90 | 26 | 71 | 21 | 4.7 | 0.9 | 0.6 | 0.5 |
| 13 | 2.3 | 26 | 46 | 114 | 65 | 23 | 56 | 24 | 4.3 | 0.9 | 0.6 | 0.5 |
| 14 | 3.0 | 23 | 46 | 90 | 133 | 22 | 44 | 27 | 4.0 | 0.9 | 0.5 | 0.6 |
| 15 | 4.9 | 29 | 40 | 86 | 112 | 23 | 36 | 27 | 3.9 | 0.8 | 0.6 | 1.1 |
| 16 | 4.6 | 22 | 42 | 117 | 81 | 25 | 29 | 26 | 3.8 | 0.8 | 0.5 | 0.6 |
| 17 | 4.4 | 34 | 57 | 100 | 70 | 25 | 25 | 24 | 3.6 | 0.8 | 0.5 | 0.5 |
| 18 | 5.8 | 34 | 52 | 86 | 75 | 30 | 22 | 22 | 3.4 | 0.9 | 0.5 | 0.4 |
| 19 | 59 | 30 | 48 | 91 | 65 | 35 | 21 | 20 | 3.0 | 0.9 | 0.5 | 0.4 |
| 20 | 52 | 34 | 52 | 96 | 55 | 40 | 19 | 18.5 | 3.2 | 0.9 | 0.6 | 0.5 |
| 21 | 40 | 54 | 63 | 77 | 100 | 38 | 17 | 16.5 | 3.1 | 0.8 | 0.6 | 0.6 |
| 22 | 32 | 60 | 64 | 220 | 348 | 42 | 16 | 15 | 2.7 | 0.8 | 0.6 | 0.6 |
| 23 | 28 | 54 | 71 | 170 | 224 | 35 | 14 | 13.5 | 2.5 | 0.8 | 0.6 | 0.6 |
| 24 | 23 | 56 | 79 | 94 | 125 | 33 | 12.5 | 12.5 | 2.2 | 0.8 | 0.6 | 0.5 |
| 25 | 20 | 87 | 69 | 101 | 81 | 32 | 11.5 | 12 | 2.1 | 0.8 | 0.6 | 0.5 |
| 26 | 17.5 | 96 | 56 | 128 | 60 | 29 | 11 | 11 | 1.9 | 0.8 | 0.6 | 0.8 |
| 27 | 15.5 | 206 | 48 | 90 | 62 | 26 | 10.5 | 10.5 | 1.7 | 0.8 | 0.6 | 0.7 |
| 28 | 15 | 119 | 67 | 72 | 60 | 24 | 9.6 | 11 | 1.4 | 0.8 | 0.6 | 0.8 |
| 29 | 13.5 | 70 | 93 | 78 | | 21 | 9.3 | 12 | 1.4 | 0.8 | 0.5 | 0.6 |
| 30 | 14 | 64 | 78 | 91 | - | 19 | 8.9 | 11 | 1.3 | 0.8 | 0.6 | 0.5 |
| 31 | 19 | - | 71 | 105 | - | 18 | - | 10 | - | 0.8 | 0.5 | - |

Minimum daily discharge of Mission Creek near Belfair, for years 1946-53.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1 | 0.2 | 0.9 | 3.4 | 2.9 | 9.4 | 5.8 | 2.6 | 0.6 | 0.3 | 0.2 | 0.1 |
| 2 | 0.2 | 0.2 | 1.9 | 3.0 | 3.0 | 8.9 | 5.3 | 2.3 | 0.6 | 0.3 | 0.2 | 0.1 |
| 3 | 0.2 | 0.2 | 3.9 | 2.8 | 3.2 | 7.5 | 4.9 | 2.1 | 0.6 | 0.3 | 0.2 | 0.1 |
| 4 | 0.2 | 0.2 | 3.5 | 2.7 | 3.1 | 6.5 | 4.8 | 1.7 | 0.5 | 0.3 | 0.2 | 0.1 |
| 5 | 0.3 | 0.2 | 3.1 | 2.6 | 2.9 | 6.6 | 4.6 | 1.6 | 0.5 | 0.3 | 0.2 | 0.1 |
| 6 | 0.2 | 0.2 | 3.0 | 2.2 | 3.6 | 5.6 | 4.2 | 1.5 | 0.4 | 0.2 | 0.2 | 0.1 |
| 7 | 0.2 | 0.2 | 2.9 | 2.1 | 3.2 | 5.6 | 4.0 | 1.4 | 0.5 | 0.2 | 0.2 | 0.2 |
| 8 | 0.2 | 0.2 | 2.6 | 1.9 | 3.0 | 5.8 | 4.4 | 1.2 | 0.6 | 0.2 | 0.2 | 0.1 |
| 9 | 0.2 | 0.3 | 2.4 | 1.9 | 4.0 | 6.0 | 4.4 | 1.1 | 0.5 | 0.2 | 0.2 | 0.1 |
| 10 | 0.2 | 0.3 | 2.6 | 3.2 | 8.7 | 5.8 | 4.7 | 1.0 | 0.6 | 0.2 | 0.2 | 0.1 |
| 11 | 0.2 | 0.4 | 2.9 | 3.2 | 8.0 | 7.3 | 4.0 | 1.0 | 0.6 | 0.3 | 0.2 | 0.1 |
| 12 | 0.2 | 0.4 | 2.7 | 3.4 | 7.8 | 7.8 | 3.6 | 0.9 | 0.5 | 0.4 | 0.2 | 0.1 |
| 13 | 0.1 | 0.4 | 5.5 | 3.0 | 7.5 | 8.0 | 3.4 | 0.9 | 0.5 | 0.3 | 0.2 | 0.1 |
| 14 | 0.1 | 0.4 | 6.6 | 2.4 | 9.0 | 8.2 | 3.1 | 0.9 | 0.5 | 0.2 | 0.2 | 0.1 |
| 15 | 0.2 | 0.4 | 6.5 | 2.4 | 8.5 | 7.7 | 2.9 | 0.9 | 0.5 | 0.2 | 0.2 | 0.1 |
| 16 | 0.1 | 0.4 | 8.4 | 2.3 | 15 | 7.5 | 2.5 | 0.9 | 0.6 | 0.2 | 0.2 | 0 |
| 17 | 0.1 | 0.4 | 10.5 | 2.3 | 14 | 6.8 | 2.3 | 0.9 | 0.4 | 0.2 | 0.2 | 0.1 |
| 18 | 0.1 | 0.4 | 10 | 3.2 | 13 | 7.3 | 2.2 | 0.8 | 0.4 | 0.2 | 0.2 | 0.1 |
| 19 | 0.2 | 0.4 | 9.6 | 3.4 | 12 | 6.6 | 2.3 | 0.8 | 0.4 | 0.2 | 0.2 | 0.1 |
| 20 | 0.2 | 0.4 | 9.1 | 3.3 | 11 | 6.0 | 2.7 | 0.8 | 0.4 | 0.2 | 0.2 | 0.1 |
| 21 | 0.2 | 0.4 | 8.9 | 3.7 | 10.5 | 8.9 | 2.6 | 0.7 | 0.4 | 0.2 | 0.2 | 0 |
| 22 | 0.1 | 0.4 | 8.5 | 6.1 | 9.8 | 8.5 | 2.5 | 0.6 | 0.4 | 0.2 | 0.2 | 0 |
| 23 | 0.2 | 0.4 | 8.6 | 5.6 | 9.3 | 7.9 | 2.3 | 0.6 | 0.4 | 0.2 | 0.2 | 0.1 |
| 24 | 0.2 | 0.4 | 7.8 | 5.5 | 9.1 | 7.5 | 2.2 | 0.6 | 0.3 | 0.2 | 0.2 | 0.1 |
| 25 | 0.2 | 0.4 | 6.9 | 5.4 | 10 | 7.2 | 2.1 | 0.5 | 0.4 | 0.2 | 0.2 | 0.1 |
| 26 | 0.3 | 0.4 | 6.7 | 5.4 | 10.5 | 6.6 | 1.8 | 0.5 | 0.4 | 0.2 | 0.2 | 0.1 |
| 27 | 0.2 | 0.4 | 6.5 | 5.2 | 9.8 | 6.3 | 1.9 | 0.5 | 0.4 | 0.2 | 0.2 | 0.1 |
| 28 | 0.2 | 0.4 | 5.7 | 5.2 | 9.6 | 5.8 | 2.1 | 0.6 | 0.4 | 0.2 | 0.2 | 0.1 |
| 29 | 0.2 | 0.5 | 5.0 | 4.7 | | 5.9 | 2.7 | 0.6 | 0.3 | 0.2 | 0.2 | 0.1 |
| 30 | 0.2 | 0.5 | 4.3 | 3.9 | - | 6.6 | 2.8 | 0.6 | 0.3 | 0.2 | 0.2 | 0.1 |
| 31 | 0.2 | - | 4.0 | 3.1 | - | 5.9 | - | 0.6 | - | 0.2 | 0.1 | - |

Table 15. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, MISSION CREEK NEAR BELFAIR

Maximum daily discharge of Mission Creek near Belfair, for years 1946-53

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.6 | 28 | 69 | 64 | 112 | 54 | 17 | 8.5 | 9.0 | 1.3 | 0.8 | 0.5 |
| 2 | 0.8 | 31 | 106 | 91 | 93 | 56 | 16 | 8.7 | 8.5 | 1.1 | 0.8 | 0.6 |
| 3 | 0.6 | 29 | 76 | 105 | 81 | 48 | 14 | 13.5 | 8.0 | 1.1 | 0.7 | 0.6 |
| 4 | 0.6 | 26 | 68 | 95 | 85 | 41 | 13 | 15.5 | 7.5 | 1.1 | 0.7 | 0.6 |
| 5 | 0.6 | 23 | 66 | 80 | 72 | 85 | 12 | 16.5 | 7.0 | 1.1 | 0.6 | 0.5 |
| 6 | 0.8 | 20 | 84 | 65 | 57 | 80 | 11.5 | 24 | 6.5 | 1.1 | 0.6 | 0.5 |
| 7 | 0.7 | 18.5 | 75 | 73 | 54 | 61 | 11.5 | 26 | 6.0 | 1.0 | 0.6 | 0.5 |
| 8 | 0.6 | 16.5 | 58 | 124 | 102 | 49 | 11 | 25 | 5.5 | 1.1 | 0.6 | 0.5 |
| 9 | 0.6 | 15 | 54 | 149 | 257 | 42 | 12 | 22 | 5.0 | 0.9 | 0.6 | 0.5 |
| 10 | 0.8 | 15 | 66 | 125 | 212 | 36 | 16 | 22 | 5.0 | 0.9 | 0.6 | 0.4 |
| 11 | 1.0 | 19 | 58 | 124 | 137 | 30 | 59 | 20 | 5.0 | 0.9 | 0.6 | 0.5 |
| 12 | 1.4 | 31 | 48 | 137 | 90 | 26 | 71 | 21 | 4.7 | 0.9 | 0.6 | 0.5 |
| 13 | 2.3 | 26 | 46 | 114 | 65 | 23 | 56 | 24 | 4.3 | 0.9 | 0.6 | 0.5 |
| 14 | 3.0 | 23 | 46 | 90 | 133 | 22 | 44 | 27 | 4.0 | 0.9 | 0.5 | 0.6 |
| 15 | 4.9 | 29 | 40 | 86 | 112 | 23 | 36 | 27 | 3.9 | 0.8 | 0.6 | 1.1 |
| 16 | 4.6 | 22 | 42 | 117 | 81 | 25 | 29 | 26 | 3.8 | 0.8 | 0.5 | 0.6 |
| 17 | 4.4 | 34 | 57 | 100 | 70 | 25 | 25 | 24 | 3.6 | 0.8 | 0.5 | 0.5 |
| 18 | 5.8 | 34 | 52 | 86 | 75 | 30 | 22 | 22 | 3.4 | 0.9 | 0.5 | 0.4 |
| 19 | 59 | 30 | 48 | 91 | 65 | 35 | 21 | 20 | 3.0 | 0.9 | 0.5 | 0.4 |
| 20 | 52 | 34 | 52 | 96 | 55 | 40 | 19 | 18.5 | 3.2 | 0.9 | 0.6 | 0.5 |
| 21 | 40 | 54 | 63 | 77 | 100 | 38 | 17 | 16.5 | 3.1 | 0.8 | 0.6 | 0.6 |
| 22 | 32 | 60 | 64 | 220 | 348 | 42 | 16 | 15 | 2.7 | 0.8 | 0.6 | 0.6 |
| 23 | 28 | 54 | 71 | 170 | 224 | 35 | 14 | 13.5 | 2.5 | 0.8 | 0.6 | 0.6 |
| 24 | 23 | 56 | 79 | 94 | 125 | 33 | 12.5 | 12.5 | 2.2 | 0.8 | 0.6 | 0.5 |
| 25 | 20 | 87 | 69 | 101 | 81 | 32 | 11.5 | 12 | 2.1 | 0.8 | 0.6 | 0.5 |
| 26 | 17.5 | 96 | 56 | 128 | 60 | 29 | 11 | 11 | 1.9 | 0.8 | 0.6 | 0.8 |
| 27 | 15.5 | 206 | 48 | 90 | 62 | 26 | 10.5 | 10.5 | 1.7 | 0.8 | 0.6 | 0.7 |
| 28 | 15 | 119 | 67 | 72 | 60 | 24 | 9.6 | 11 | 1.4 | 0.8 | 0.6 | 0.8 |
| 29 | 13.5 | 70 | 93 | 78 | | 21 | 9.3 | 12 | 1.4 | 0.8 | 0.5 | 0.6 |
| 30 | 14 | 64 | 78 | 91 | - | 19 | 8.9 | 11 | 1.3 | 0.8 | 0.6 | 0.5 |
| 31 | 19 | - | 71 | 105 | - | 18 | - | 10 | - | 0.8 | 0.5 | - |

Minimum daily discharge of Mission Creek near Belfair, for years 1946-53.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1 | 0.2 | 0.9 | 3.4 | 2.9 | 9.4 | 5.8 | 2.6 | 0.6 | 0.3 | 0.2 | 0.1 |
| 2 | 0.2 | 0.2 | 1.9 | 3.0 | 3.0 | 8.9 | 5.3 | 2.3 | 0.6 | 0.3 | 0.2 | 0.1 |
| 3 | 0.2 | 0.2 | 3.9 | 2.8 | 3.2 | 7.5 | 4.9 | 2.1 | 0.6 | 0.3 | 0.2 | 0.1 |
| 4 | 0.2 | 0.2 | 3.5 | 2.7 | 3.1 | 6.5 | 4.8 | 1.7 | 0.5 | 0.3 | 0.2 | 0.1 |
| 5 | 0.3 | 0.2 | 3.1 | 2.6 | 2.9 | 6.6 | 4.6 | 1.6 | 0.5 | 0.3 | 0.2 | 0.1 |
| 6 | 0.2 | 0.2 | 3.0 | 2.2 | 3.6 | 5.6 | 4.2 | 1.5 | 0.4 | 0.2 | 0.2 | 0.1 |
| 7 | 0.2 | 0.2 | 2.9 | 2.1 | 3.2 | 5.6 | 4.0 | 1.4 | 0.5 | 0.2 | 0.2 | 0.2 |
| 8 | 0.2 | 0.2 | 2.6 | 1.9 | 3.0 | 5.8 | 4.4 | 1.2 | 0.6 | 0.2 | 0.2 | 0.1 |
| 9 | 0.2 | 0.3 | 2.4 | 1.9 | 4.0 | 6.0 | 4.4 | 1.1 | 0.5 | 0.2 | 0.2 | 0.1 |
| 10 | 0.2 | 0.3 | 2.6 | 3.2 | 8.7 | 5.8 | 4.7 | 1.0 | 0.6 | 0.2 | 0.2 | 0.1 |
| 11 | 0.2 | 0.4 | 2.9 | 3.2 | 8.0 | 7.3 | 4.0 | 1.0 | 0.6 | 0.3 | 0.2 | 0.1 |
| 12 | 0.2 | 0.4 | 2.7 | 3.4 | 7.8 | 7.8 | 3.6 | 0.9 | 0.5 | 0.4 | 0.2 | 0.1 |
| 13 | 0.1 | 0.4 | 5.5 | 3.0 | 7.5 | 8.0 | 3.4 | 0.9 | 0.5 | 0.3 | 0.2 | 0.1 |
| 14 | 0.1 | 0.4 | 6.6 | 2.4 | 9.0 | 8.2 | 3.1 | 0.9 | 0.5 | 0.2 | 0.2 | 0.1 |
| 15 | 0.2 | 0.4 | 6.5 | 2.4 | 8.5 | 7.7 | 2.9 | 0.9 | 0.5 | 0.2 | 0.2 | 0.1 |
| 16 | 0.1 | 0.4 | 8.4 | 2.3 | 15 | 7.5 | 2.5 | 0.9 | 0.6 | 0.2 | 0.2 | 0 |
| 17 | 0.1 | 0.4 | 10.5 | 2.3 | 14 | 6.8 | 2.3 | 0.9 | 0.4 | 0.2 | 0.2 | 0.1 |
| 18 | 0.1 | 0.4 | 10 | 3.2 | 13 | 7.3 | 2.2 | 0.8 | 0.4 | 0.2 | 0.2 | 0.1 |
| 19 | 0.2 | 0.4 | 9.6 | 3.4 | 12 | 6.6 | 2.3 | 0.8 | 0.4 | 0.2 | 0.2 | 0.1 |
| 20 | 0.2 | 0.4 | 9.1 | 3.3 | 11 | 6.0 | 2.7 | 0.8 | 0.4 | 0.2 | 0.2 | 0.1 |
| 21 | 0.2 | 0.4 | 8.9 | 3.7 | 10.5 | 8.9 | 2.6 | 0.7 | 0.4 | 0.2 | 0.2 | 0 |
| 22 | 0.1 | 0.4 | 8.5 | 6.1 | 9.8 | 8.5 | 2.5 | 0.6 | 0.4 | 0.2 | 0.2 | 0 |
| 23 | 0.2 | 0.4 | 8.6 | 5.6 | 9.3 | 7.9 | 2.3 | 0.6 | 0.4 | 0.2 | 0.2 | 0.1 |
| 24 | 0.2 | 0.4 | 7.8 | 5.5 | 9.1 | 7.5 | 2.2 | 0.6 | 0.3 | 0.2 | 0.2 | 0.1 |
| 25 | 0.2 | 0.4 | 6.9 | 5.4 | 10 | 7.2 | 2.1 | 0.5 | 0.4 | 0.2 | 0.2 | 0.1 |
| 26 | 0.3 | 0.4 | 6.7 | 5.4 | 10.5 | 6.6 | 1.8 | 0.5 | 0.4 | 0.2 | 0.2 | 0.1 |
| 27 | 0.2 | 0.4 | 6.5 | 5.2 | 9.8 | 6.3 | 1.9 | 0.5 | 0.4 | 0.2 | 0.2 | 0.1 |
| 28 | 0.2 | 0.4 | 5.7 | 5.2 | 9.6 | 5.8 | 2.1 | 0.6 | 0.4 | 0.2 | 0.2 | 0.1 |
| 29 | 0.2 | 0.5 | 5.0 | 4.7 | | 5.9 | 2.7 | 0.6 | 0.3 | 0.2 | 0.2 | 0.1 |
| 30 | 0.2 | 0.5 | 4.3 | 3.9 | - | 6.6 | 2.8 | 0.6 | 0.3 | 0.2 | 0.2 | 0.1 |
| 31 | 0.2 | - | 4.0 | 3.1 | - | 5.9 | - | 0.6 | - | 0.2 | 0.1 | - |

Table 16. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, GOLD CREEK NEAR BREMERTON

Maximum daily discharge of Gold Creek near Bremerton, for years 1946-60

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.4 | 22 | 37 | 39 | 39 | 18 | 21 | 18.5 | 4.7 | 2.3 | 1.4 | 0.8 |
| 2 | 2.4 | 33 | 37 | 37 | 60 | 18 | 14.5 | 10.5 | 4.7 | 1.8 | 1.4 | 0.9 |
| 3 | 1.4 | 155 | 22 | 49 | 30 | 18.5 | 12 | 9.1 | 4.2 | 1.8 | 1.3 | 0.9 |
| 4 | 1.6 | 74 | 22 | 51 | 31 | 32 | 10.5 | 9.5 | 4.2 | 1.9 | 1.1 | 1.0 |
| 5 | 1.4 | 25 | 22 | 85 | 20 | 39 | 10 | 11 | 4.0 | 2.3 | 1.1 | 1.0 |
| 6 | 1.7 | 16.5 | 31 | 55 | 23 | 25 | 9.1 | 16 | 4.0 | 2.1 | 1.2 | 1.1 |
| 7 | 2.2 | 11.5 | 26 | 38 | 35 | 20 | 8.4 | 14 | 3.6 | 1.7 | 1.1 | 1.3 |
| 8 | 5.8 | 9.6 | 19 | 56 | 71 | 19.5 | 9.7 | 10 | 4.2 | 2.4 | 1.1 | 1.1 |
| 9 | 6.2 | 7.9 | 50 | 46 | 99 | 24 | 9.0 | 8.6 | 4.4 | 2.2 | 1.3 | 1.1 |
| 10 | 5.0 | 7.8 | 95 | 26 | 52 | 24 | 12 | 8.0 | 4.2 | 2.0 | 1.1 | 0.8 |
| 11 | 4.1 | 13 | 50 | 50 | 30 | 17 | 53 | 6.5 | 3.8 | 1.6 | 1.0 | 1.0 |
| 12 | 5.0 | 28 | 35 | 43 | 29 | 15 | 32 | 7.7 | 3.5 | 1.5 | 1.1 | 0.7 |
| 13 | 3.8 | 23 | 25 | 30 | 63 | 13 | 18 | 10 | 3.8 | 1.6 | 1.1 | 1.6 |
| 14 | 3.6 | 17.5 | 18 | 22 | 72 | 13 | 14 | 12 | 3.4 | 1.5 | 1.1 | 1.2 |
| 15 | 6.6 | 13 | 66 | 32 | 55 | 15 | 12.5 | 12 | 3.0 | 1.5 | 1.3 | 3.2 |
| 16 | 7.4 | 26 | 31 | 40 | 48 | 18 | 12.5 | 12 | 3.0 | 1.6 | 1.2 | 1.5 |
| 17 | 27 | 30 | 27 | 34 | 66 | 16 | 13.5 | 8.9 | 3.1 | 1.5 | 1.1 | 1.3 |
| 18 | 49 | 67 | 26 | 24 | 32 | 22 | 17 | 7.4 | 2.8 | 1.5 | 1.0 | 1.3 |
| 19 | 58 | 67 | 18 | 29 | 65 | 29 | 16 | 6.3 | 3.1 | 1.4 | 1.0 | 2.6 |
| 20 | 20 | 86 | 37 | 68 | 49 | 21 | 26 | 6.0 | 3.0 | 1.4 | 1.0 | 2.8 |
| 21 | 12 | 58 | 56 | 120 | 54 | 34 | 20 | 5.5 | 2.8 | 1.3 | 1.3 | 2.2 |
| 22 | 9.8 | 31 | 46 | 73 | 127 | 42 | 14 | 5.0 | 2.7 | 1.2 | 1.1 | 1.8 |
| 23 | 8.9 | 40 | 34 | 35 | 59 | 70 | 11.5 | 5.0 | 2.5 | 1.2 | 1.0 | 1.5 |
| 24 | 10 | 60 | 30 | 65 | 61 | 39 | 9.6 | 4.7 | 2.4 | 1.2 | 1.0 | 1.4 |
| 25 | 18 | 36 | 41 | 68 | 49 | 26 | 8.6 | 4.4 | 2.4 | 1.2 | 2.3 | 1.3 |
| 26 | 15.5 | 86 | 36 | 41 | 57 | 22 | 7.8 | 4.2 | 2.3 | 3.0 | 1.3 | 1.6 |
| 27 | 12 | 86 | 24 | 35 | 25 | 17 | 6.9 | 3.8 | 2.1 | 2.4 | 1.1 | 2.0 |
| 28 | 10.5 | 32 | 50 | 29 | 22 | 15 | 6.6 | 6.5 | 3.4 | 1.8 | 1.0 | 2.2 |
| 29 | 15.5 | 18 | 32 | 73 | | 15.5 | 16 | 5.7 | 3.4 | 1.6 | 1.0 | 1.8 |
| 30 | 14.5 | 32 | 25 | 68 | - | 25 | 49 | 5.2 | 2.8 | 1.4 | 1.0 | 4.5 |
| 31 | 14 | - | 17.5 | 36 | - | 26 | - | 4.7 | - | 1.6 | 1.0 | - |

Minimum daily discharge of Gold Creek near Bremerton, for years 1946-60

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.4 | 0.7 | 1.6 | 3.7 | 1.7 | 4.1 | 3.0 | 1.7 | 1.0 | 0.5 | 0.5 | 0.4 |
| 2 | 0.3 | 0.6 | 2.0 | 3.5 | 1.8 | 3.6 | 2.8 | 1.5 | 1.0 | 0.5 | 0.5 | 0.4 |
| 3 | 0.4 | 0.6 | 2.8 | 3.4 | 1.8 | 3.4 | 2.5 | 1.8 | 0.9 | 0.5 | 0.5 | 0.4 |
| 4 | 0.4 | 0.6 | 3.1 | 3.3 | 1.8 | 3.2 | 2.7 | 1.7 | 1.0 | 0.6 | 0.4 | 0.4 |
| 5 | 0.3 | 0.7 | 2.9 | 3.2 | 1.8 | 3.0 | 2.7 | 1.8 | 0.9 | 0.6 | 0.4 | 0.3 |
| 6 | 0.3 | 0.7 | 3.4 | 3.2 | 2.1 | 2.8 | 2.4 | 1.7 | 0.9 | 0.6 | 0.4 | 0.4 |
| 7 | 0.3 | 0.7 | 3.4 | 3.2 | 1.8 | 2.8 | 2.4 | 1.7 | 0.9 | 0.6 | 0.4 | 0.4 |
| 8 | 0.3 | 0.7 | 3.2 | 3.2 | 1.7 | 3.0 | 2.8 | 1.7 | 0.9 | 0.5 | 0.4 | 0.4 |
| 9 | 0.3 | 0.8 | 3.2 | 3.2 | 2.2 | 3.4 | 3.0 | 1.6 | 0.9 | 0.6 | 0.4 | 0.3 |
| 10 | 0.3 | 1.3 | 3.7 | 4.7 | 5.0 | 3.4 | 2.7 | 1.5 | 0.9 | 0.6 | 0.3 | 0.4 |
| 11 | 0.3 | 1.2 | 3.2 | 4.4 | 4.9 | 3.8 | 2.5 | 1.6 | 0.9 | 0.7 | 0.3 | 0.3 |
| 12 | 0.3 | 1.2 | 3.2 | 4.2 | 4.7 | 3.8 | 2.5 | 1.5 | 1.0 | 0.6 | 0.3 | 0.3 |
| 13 | 0.3 | 1.2 | 3.1 | 3.8 | 4.7 | 3.6 | 2.3 | 1.4 | 0.9 | 0.5 | 0.3 | 0.4 |
| 14 | 0.4 | 1.2 | 3.2 | 3.6 | 4.2 | 3.5 | 2.3 | 1.4 | 0.9 | 0.6 | 0.3 | 0.3 |
| 15 | 0.4 | 1.1 | 3.1 | 3.2 | 3.8 | 3.4 | 2.2 | 1.3 | 0.8 | 0.6 | 0.3 | 0.3 |
| 16 | 0.4 | 1.1 | 3.2 | 3.0 | 4.5 | 3.4 | 2.1 | 1.4 | 0.8 | 0.5 | 0.3 | 0.3 |
| 17 | 0.6 | 1.1 | 3.7 | 2.8 | 4.5 | 3.4 | 2.1 | 1.4 | 0.7 | 0.5 | 0.3 | 0.3 |
| 18 | 0.5 | 1.0 | 3.2 | 2.8 | 4.5 | 3.6 | 2.2 | 1.3 | 0.8 | 0.5 | 0.3 | 0.4 |
| 19 | 0.5 | 0.8 | 4.3 | 2.8 | 4.5 | 3.4 | 2.1 | 1.3 | 0.8 | 0.5 | 0.3 | 0.4 |
| 20 | 0.5 | 0.8 | 3.9 | 2.7 | 4.3 | 3.2 | 2.1 | 1.4 | 0.7 | 0.5 | 0.3 | 0.4 |
| 21 | 0.5 | 0.9 | 5.8 | 2.5 | 4.1 | 3.8 | 1.8 | 1.2 | 0.7 | 0.5 | 0.3 | 0.4 |
| 22 | 0.5 | 0.9 | 5.6 | 2.5 | 3.8 | 3.6 | 1.7 | 1.1 | 0.6 | 0.6 | 0.3 | 0.4 |
| 23 | 0.6 | 0.9 | 5.3 | 2.4 | 3.8 | 3.6 | 1.8 | 1.1 | 0.6 | 0.5 | 0.4 | 0.3 |
| 24 | 0.7 | 0.8 | 4.8 | 2.4 | 4.5 | 3.6 | 1.8 | 1.1 | 0.6 | 0.5 | 0.4 | 0.3 |
| 25 | 0.7 | 0.8 | 4.7 | 2.4 | 4.1 | 3.4 | 1.8 | 1.1 | 0.6 | 0.5 | 0.4 | 0.3 |
| 26 | 0.7 | 0.8 | 4.5 | 2.4 | 3.8 | 3.0 | 1.8 | 1.0 | 0.6 | 0.4 | 0.3 | 0.4 |
| 27 | 0.6 | 0.8 | 4.0 | 2.2 | 3.6 | 3.0 | 1.9 | 1.0 | 0.6 | 0.4 | 0.4 | 0.4 |
| 28 | 0.5 | 0.8 | 4.5 | 2.0 | 4.5 | 2.7 | 2.1 | 1.0 | 0.6 | 0.5 | 0.4 | 0.3 |
| 29 | 0.6 | 0.9 | 4.4 | 2.0 | | 3.2 | 2.0 | 1.0 | 0.6 | 0.5 | 0.4 | 0.4 |
| 30 | 0.7 | 1.1 | 4.1 | 1.8 | - | 3.4 | 2.0 | 1.0 | 0.6 | 0.4 | 0.4 | 0.4 |
| 31 | 0.8 | - | 4.0 | 1.8 | - | 3.0 | - | 1.0 | - | 0.5 | 0.4 | - |

Table 17. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, TAHUYA RIVER NEAR BREMERTON

Maximum daily discharge of Tahuya River near Bremerton, for years 1945-56

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.0 | 81 | 167 | 102 | 134 | 79 | 65 | 16 | 16 | 6.2 | 2.4 | 1.7 |
| 2 | 3.8 | 116 | 170 | 158 | 203 | 77 | 54 | 16 | 15 | 4.1 | 2.2 | 1.7 |
| 3 | 3.8 | 448 | 120 | 170 | 134 | 90 | 45 | 33 | 14 | 3.2 | 2.1 | 1.7 |
| 4 | 4.3 | 323 | 124 | 173 | 121 | 106 | 38 | 40 | 14 | 3.5 | 2.0 | 1.9 |
| 5 | 4.3 | 150 | 110 | 302 | 102 | 135 | 35 | 44 | 13 | 3.9 | 1.9 | 1.8 |
| 6 | 4.9 | 90 | 106 | 374 | 80 | 118 | 33 | 67 | 11 | 4.1 | 1.8 | 1.8 |
| 7 | 5.8 | 66 | 106 | 269 | 76 | 88 | 30 | 60 | 10 | 4.9 | 1.8 | 1.8 |
| 8 | 5.2 | 48 | 90 | 200 | 172 | 65 | 39 | 47 | 9.2 | 9.0 | 1.8 | 1.8 |
| 9 | 6.0 | 39 | 95 | 190 | 397 | 79 | 40 | 39 | 11.5 | 6.2 | 1.7 | 1.9 |
| 10 | 8.0 | 34 | 118 | 140 | 271 | 104 | 45 | 35 | 11.5 | 5.9 | 1.8 | 1.9 |
| 11 | 8.6 | 40 | 98 | 180 | 162 | 77 | 130 | 29 | 9.5 | 7.4 | 1.8 | 1.8 |
| 12 | 9.0 | 100 | 116 | 160 | 118 | 59 | 143 | 30 | 8.0 | 5.0 | 1.7 | 1.8 |
| 13 | 7.5 | 90 | 85 | 140 | 281 | 45 | 88 | 44 | 6.9 | 4.1 | 1.8 | 2.3 |
| 14 | 7.3 | 82 | 66 | 100 | 275 | 41 | 61 | 56 | 7.7 | 5.8 | 1.7 | 2.3 |
| 15 | 15 | 65 | 81 | 95 | 192 | 62 | 46 | 53 | 7.5 | 4.4 | 1.7 | 4.3 |
| 16 | 35 | 100 | 72 | 153 | 215 | 70 | 41 | 46 | 9.2 | 4.1 | 1.9 | 4.0 |
| 17 | 48 | 135 | 106 | 117 | 262 | 69 | 45 | 42 | 7.5 | 3.8 | 1.7 | 7.0 |
| 18 | 110 | 222 | 100 | 103 | 184 | 63 | 41 | 36 | 6.2 | 3.0 | 2.3 | 4.5 |
| 19 | 212 | 294 | 94 | 120 | 234 | 90 | 35 | 28 | 6.9 | 3.3 | 1.7 | 3.0 |
| 20 | 110 | 156 | 122 | 150 | 272 | 88 | 29 | 26 | 6.5 | 2.8 | 1.7 | 3.8 |
| 21 | 65 | 141 | 232 | 391 | 255 | 104 | 24 | 24 | 6.5 | 3.0 | 1.7 | 3.5 |
| 22 | 45 | 121 | 215 | 371 | 385 | 148 | 22 | 21 | 5.8 | 2.4 | 1.7 | 3.2 |
| 23 | 40 | 101 | 141 | 167 | 249 | 232 | 21 | 18 | 5.5 | 2.2 | 1.7 | 3.0 |
| 24 | 45 | 128 | 121 | 129 | 142 | 167 | 18.5 | 16 | 5.2 | 2.2 | 1.7 | 4.0 |
| 25 | 51 | 181 | 115 | 170 | 95 | 110 | 22 | 14 | 5.2 | 1.9 | 1.7 | 10 |
| 26 | 54 | 166 | 95 | 180 | 132 | 82 | 23 | 14 | 4.9 | 2.5 | 1.7 | 4.5 |
| 27 | 46 | 364 | 79 | 129 | 114 | 63 | 22 | 13 | 4.6 | 3.4 | 1.8 | 4.6 |
| 28 | 40 | 170 | 143 | 110 | 84 | 54 | 21 | 20 | 4.3 | 3.5 | 2.5 | 5.2 |
| 29 | 52 | 131 | 164 | 109 | | 56 | 19 | 22 | 6.6 | 3.4 | 3.5 | 5.2 |
| 30 | 51 | 139 | 110 | 201 | - | 72 | 18 | 22 | 7.9 | 2.9 | 2.8 | 4.6 |
| 31 | 43 | - | 95 | 166 | - | 77 | - | 19 | - | 2.6 | 1.8 | - |

Minimum daily discharge of Tahuya River near Bremerton, for years 1945-56

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2 | 0.2 | 0.6 | 12 | 7.7 | 10 | 7.7 | 7.0 | 1.5 | 0.8 | 0.4 | 0.1 |
| 2 | 0.2 | 0.2 | 0.9 | 12 | 7.7 | 10 | 7.0 | 5.8 | 1.4 | 0.8 | 0.4 | 0.1 |
| 3 | 0.2 | 0.2 | 2.0 | 11 | 7.7 | 10 | 6.0 | 3.3 | 1.3 | 0.4 | 0.4 | 0.1 |
| 4 | 0.1 | 0.2 | 6.0 | 10 | 7.7 | 9.4 | 5.8 | 2.4 | 1.5 | 0.2 | 0.4 | 0.1 |
| 5 | 0.1 | 0.2 | 6.5 | 9.5 | 7.3 | 8.5 | 5.8 | 3.3 | 1.2 | 0.2 | 0.4 | 0.1 |
| 6 | 0.1 | 0.2 | 6.2 | 9.5 | 6.9 | 8.2 | 5.6 | 2.4 | 1.5 | 0.2 | 0.2 | 0.1 |
| 7 | 0.1 | 0.2 | 6.0 | 9.5 | 7.3 | 8.5 | 5.2 | 3.3 | 1.5 | 0.2 | 0.4 | 0.1 |
| 8 | 0.1 | 0.2 | 5.8 | 9.0 | 7.3 | 9.1 | 9.4 | 3.6 | 1.5 | 0.3 | 0.4 | 0.1 |
| 9 | 0.2 | 0.3 | 5.8 | 9.5 | 9.1 | 10 | 9.1 | 3.1 | 1.4 | 0.4 | 0.4 | 0.1 |
| 10 | 0.2 | 0.8 | 6.0 | 14 | 14.5 | 9.6 | 8.8 | 2.2 | 1.3 | 0.6 | 0.3 | 0.1 |
| 11 | 0.2 | 1.0 | 6.5 | 15 | 14.5 | 11 | 8.0 | 2.7 | 1.1 | 0.6 | 0.3 | 0.2 |
| 12 | 0.2 | 0.9 | 7.7 | 16 | 14 | 10 | 8.0 | 2.2 | 1.3 | 0.6 | 0.3 | 0.1 |
| 13 | 0.2 | 1.2 | 12 | 14 | 13 | 9.1 | 7.2 | 2.2 | 1.3 | 0.5 | 0.3 | 0.1 |
| 14 | 0.2 | 1.5 | 11 | 12 | 12.5 | 9.1 | 5.6 | 2.1 | 1.3 | 0.4 | 0.3 | 0.2 |
| 15 | 0.2 | 0.9 | 10.5 | 11 | 11.5 | 8.1 | 5.0 | 2.1 | 1.1 | 0.4 | 0.3 | 0.2 |
| 16 | 0.2 | 0.7 | 9.8 | 10 | 11.5 | 7.7 | 4.7 | 2.1 | 1.1 | 0.4 | 0.3 | 0.2 |
| 17 | 0.2 | 0.5 | 14 | 9 | 11.5 | 7.3 | 4.5 | 2.9 | 1.0 | 0.3 | 0.2 | 0.2 |
| 18 | 0.2 | 0.3 | 15 | 8 | 11.5 | 9.1 | 5.2 | 3.6 | 1.0 | 0.2 | 0.2 | 0.2 |
| 19 | 0.2 | 0.2 | 14 | 14 | 13 | 7.7 | 6 | 3.1 | 1.0 | 0.2 | 0.2 | 0.2 |
| 20 | 0.2 | 0.2 | 13 | 13 | 13 | 7.3 | 6 | 2.1 | 1.0 | 0.2 | 0.2 | 0.2 |
| 21 | 0.2 | 0.2 | 12 | 13 | 12 | 12 | 5.5 | 2.2 | 0.9 | 0.2 | 0.2 | 0.2 |
| 22 | 0.2 | 0.2 | 12 | 11 | 11.5 | 11 | 4.9 | 1.6 | 0.9 | 0.2 | 0.2 | 0.2 |
| 23 | 0.2 | 0.2 | 17 | 11 | 11.5 | 10 | 4.7 | 2.1 | 0.5 | 0.3 | 0.2 | 0.1 |
| 24 | 0.2 | 0.3 | 17 | 10 | 11.5 | 10 | 3.3 | 1.9 | 0.4 | 0.3 | 0.2 | 0.1 |
| 25 | 0.2 | 0.2 | 16 | 9.1 | 12.5 | 9.3 | 2.7 | 1.9 | 0.4 | 0.3 | 0.2 | 0.1 |
| 26 | 0.2 | 0.3 | 16 | 8.6 | 11.5 | 7.9 | 2.7 | 1.8 | 0.4 | 0.3 | 0.2 | 0.2 |
| 27 | 0.2 | 0.2 | 15 | 8.6 | 10.5 | 7.4 | 3.2 | 1.8 | 0.5 | 0.2 | 0.2 | 0.2 |
| 28 | 0.2 | 0.3 | 15 | 8.1 | 11 | 7.0 | 3.7 | 1.8 | 0.8 | 0.3 | 0.2 | 0.2 |
| 29 | 0.2 | 0.3 | 14 | 8.1 | | 7.4 | 5.0 | 1.6 | 0.8 | 0.4 | 0.2 | 0.2 |
| 30 | 0.2 | 0.4 | 14 | 8.1 | - | 9.2 | 6.7 | 1.6 | 0.8 | 0.2 | 0.2 | 0.2 |
| 31 | 0.2 | - | 12 | 7.7 | - | 8.1 | - | 1.5 | - | 0.2 | 0.2 | - |

Table 18. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, PANTHER CREEK NEAR BREMERTON

Maximum daily discharge of Panther Creek near Bremerton, for years 1945-53

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1 | 10.5 | 20 | 23 | 22 | 13 | 4.5 | 1.7 | 2.4 | 1.0 | 0.1 | 0 |
| 2 | 0.1 | 8.8 | 24 | 23 | 29 | 14 | 3.9 | 2.8 | 2.1 | 0.8 | 0.1 | 0 |
| 3 | 0.1 | 7.3 | 19 | 23 | 19 | 12.5 | 3.5 | 4.5 | 2.1 | 0.8 | 0.1 | 0 |
| 4 | 0.1 | 6.8 | 18.5 | 24 | 20 | 15 | 3.0 | 5.0 | 1.8 | 0.6 | 0.1 | 0 |
| 5 | 0.1 | 5.7 | 16.5 | 19 | 16 | 19 | 2.8 | 5.2 | 1.7 | 0.4 | 0.1 | 0 |
| 6 | 0.1 | 4.7 | 22 | 14 | 13 | 14.5 | 2.5 | 8.4 | 1.5 | 0.4 | 0.1 | 0 |
| 7 | 0.1 | 4.3 | 18 | 21 | 12.5 | 12 | 2.8 | 7.3 | 1.4 | 0.3 | 0.1 | 0 |
| 8 | 0.1 | 4.1 | 12 | 33 | 24 | 10.5 | 2.5 | 6.5 | 1.3 | 0.3 | 0.1 | 0 |
| 9 | 0.1 | 3.3 | 13.5 | 25 | 44 | 9.1 | 2.8 | 6.0 | 1.1 | 0.4 | 0.1 | 0 |
| 10 | 0.1 | 3.2 | 15 | 19.5 | 34 | 7.9 | 4.6 | 5.4 | 0.9 | 0.3 | 0.1 | 0 |
| 11 | 0.2 | 5.4 | 12 | 29 | 25 | 6.8 | 25 | 5.0 | 0.9 | 0.3 | 0.1 | 0 |
| 12 | 0.2 | 8.3 | 10 | 25 | 19.5 | 6.0 | 20 | 5.2 | 1.0 | 0.2 | 0.1 | 0 |
| 13 | 0.2 | 5.9 | 11 | 21 | 21 | 5.6 | 13 | 7.6 | 1.0 | 0.2 | 0.1 | 0 |
| 14 | 0.2 | 4.8 | 10 | 18 | 38 | 5.9 | 8.7 | 8.4 | 0.9 | 0.2 | 0.1 | 0 |
| 15 | 0.4 | 4.3 | 8.8 | 21 | 26 | 8.0 | 6.3 | 7.3 | 0.8 | 0.2 | 0.1 | 0 |
| 16 | 1.1 | 10.5 | 12 | 26 | 20 | 7.2 | 6.0 | 6.5 | 0.6 | 0.2 | 0.1 | 0 |
| 17 | 6.0 | 11 | 13.5 | 20 | 19.5 | 8.4 | 6.5 | 6.2 | 0.6 | 0.2 | 0.1 | 0 |
| 18 | 13.5 | 8.2 | 12 | 19.5 | 14 | 10.5 | 5.4 | 5.4 | 0.6 | 0.2 | 0.1 | 0 |
| 19 | 18 | 7.6 | 11 | 21 | 12 | 12.5 | 4.7 | 4.5 | 0.5 | 0.2 | 0.1 | 0 |
| 20 | 10.5 | 12 | 13 | 20 | 9.3 | 11.5 | 4.1 | 4.1 | 0.5 | 0.1 | 0.1 | 0 |
| 21 | 8.2 | 15.5 | 14.5 | 28 | 25 | 10.5 | 3.7 | 3.7 | 0.5 | 0.1 | 0.1 | 0 |
| 22 | 7.3 | 14 | 14 | 26 | 59 | 11 | 3.2 | 3.2 | 0.5 | 0.1 | 0.1 | 0 |
| 23 | 7.0 | 13 | 16 | 23 | 30 | 10.5 | 2.7 | 2.8 | 0.4 | 0.1 | 0 | 0 |
| 24 | 5.7 | 14 | 17 | 19 | 21 | 10.5 | 2.5 | 2.5 | 0.4 | 0.1 | 0 | 0 |
| 25 | 5.0 | 20 | 14.5 | 28 | 18.5 | 9.1 | 3.2 | 2.4 | 0.4 | 0.1 | 0 | 0 |
| 26 | 4.3 | 29 | 12 | 22 | 16.5 | 8.4 | 2.8 | 2.2 | 0.4 | 0.1 | 0 | 0 |
| 27 | 3.9 | 30 | 11.5 | 18 | 17 | 7.9 | 2.5 | 2.1 | 0.3 | 0.1 | 0 | 0 |
| 28 | 4.1 | 18.5 | 18 | 17.5 | 15 | 7.3 | 2.1 | 3.2 | 0.3 | 0.1 | 0 | 0 |
| 29 | 3.9 | 14 | 26 | 16.5 | | 6.6 | 2.0 | 3.3 | 0.6 | 0.1 | 0 | 0 |
| 30 | 4.5 | 16 | 21 | 25 | - | 5.6 | 1.8 | 3.2 | 1.0 | 0.1 | 0 | 0 |
| 31 | 7.3 | - | 18 | 20 | - | 4.7 | - | 2.7 | - | 0.1 | 0 | - |

Minimum daily discharge of Panther Creek near Bremerton, for years 1945-53

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0.5 | 1.2 | 2.0 | 1.3 | 0.5 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0.5 | 1.1 | 1.8 | 1.2 | 0.4 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0.4 | 1.1 | 1.8 | 1.1 | 0.4 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0.1 | 0.4 | 1.1 | 1.7 | 1.0 | 0.4 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0.3 | 0.4 | 1.0 | 1.5 | 1.0 | 0.3 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0.5 | 0.4 | 0.9 | 1.5 | 1.0 | 0.3 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0.8 | 0.4 | 0.9 | 1.3 | 0.9 | 0.3 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0.8 | 0.3 | 1.7 | 1.2 | 1.0 | 0.3 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0.7 | 0.3 | 1.7 | 1.1 | 1.0 | 0.2 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0.8 | 0.6 | 3.0 | 1.1 | 0.9 | 0.2 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0.8 | 0.3 | 2.5 | 1.2 | 0.8 | 0.2 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0.8 | 0.9 | 2.4 | 1.5 | 0.8 | 0.2 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 2.1 | 0.8 | 2.2 | 1.5 | 0.7 | 0.1 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 2.0 | 0.6 | 3.5 | 1.2 | 0.6 | 0.1 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 1.7 | 0.5 | 3.2 | 1.4 | 0.6 | 0.1 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 1.4 | 0.5 | 3.4 | 1.3 | 0.5 | 0.1 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 1.2 | 0.5 | 3.8 | 1.2 | 0.5 | 0.1 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 1.1 | 0.7 | 3.4 | 1.3 | 0.5 | 0.1 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0.9 | 0.9 | 3.0 | 1.2 | 0.4 | 0.1 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 1.0 | 0.8 | 2.9 | 1.1 | 0.4 | 0.1 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 1.7 | 0.9 | 2.5 | 1.8 | 0.3 | 0.1 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 2.1 | 2.4 | 2.4 | 1.7 | 0.3 | 0.1 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 1.8 | 2.2 | 2.1 | 1.6 | 0.3 | 0.1 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 1.4 | 2.1 | 2.1 | 1.6 | 0.3 | 0.1 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 1.1 | 2.0 | 2.4 | 1.4 | 0.2 | 0.1 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 1.0 | 1.7 | 2.4 | 1.3 | 0.2 | 0.1 | 0 | 0 | 0 | 0 |
| 27 | 0 | 0 | 1.1 | 1.5 | 2.2 | 1.1 | 0.3 | 0.1 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 1.0 | 1.4 | 2.1 | 1.0 | 0.4 | 0 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0.8 | 1.3 | | 1.1 | 0.4 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0.7 | 1.3 | - | 1.3 | 0.5 | 0 | 0 | 0 | 0 | 0 |
| 31 | 0 | 0 | 0.6 | 1.3 | - | 1.3 | - | 0 | 0 | 0 | 0 | 0 |

Table 19. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, TAHUYA RIVER NEAR BELFAIR

Maximum daily discharge of Tahuya River near Belfair, for years 1945-56

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.7 | 171 | 387 | 278 | 400 | 172 | 147 | 29 | 29 | 12 | 1.2 | 0.4 |
| 2 | 4.1 | 188 | 469 | 402 | 416 | 175 | 117 | 32 | 27 | 8.8 | 1.1 | 0.4 |
| 3 | 3.8 | 1,010 | 291 | 450 | 283 | 192 | 97 | 67 | 25 | 6.6 | 1.0 | 0.4 |
| 4 | 4.1 | 845 | 308 | 421 | 300 | 262 | 81 | 113 | 23 | 5.3 | 1.0 | 0.4 |
| 5 | 4.1 | 409 | 269 | 667 | 250 | 318 | 85 | 115 | 22 | 4.5 | 1.0 | 0.4 |
| 6 | 4.4 | 239 | 284 | 598 | 200 | 262 | 76 | 164 | 19.5 | 4.1 | 1.0 | 0.4 |
| 7 | 6.0 | 169 | 228 | 446 | 177 | 184 | 61 | 151 | 17.5 | 4.1 | 0.9 | 0.4 |
| 8 | 6.0 | 127 | 188 | 490 | 397 | 140 | 76 | 134 | 16.5 | 5.6 | 0.7 | 0.4 |
| 9 | 8.4 | 105 | 210 | 514 | 700 | 156 | 83 | 112 | 20 | 10 | 0.6 | 0.4 |
| 10 | 18 | 86 | 286 | 340 | 543 | 198 | 77 | 99 | 19.5 | 7.6 | 0.5 | 0.4 |
| 11 | 13 | 111 | 217 | 428 | 378 | 140 | 338 | 82 | 17 | 7.6 | 0.6 | 0.5 |
| 12 | 18.5 | 222 | 303 | 452 | 247 | 105 | 323 | 77 | 15 | 6.9 | 0.6 | 0.4 |
| 13 | 13.5 | 155 | 194 | 342 | 510 | 89 | 200 | 113 | 13.5 | 5.3 | 0.6 | 0.4 |
| 14 | 11 | 105 | 159 | 241 | 563 | 93 | 152 | 151 | 13 | 4.2 | 0.6 | 0.5 |
| 15 | 9.0 | 108 | 202 | 262 | 396 | 112 | 113 | 140 | 12 | 5.0 | 0.6 | 0.9 |
| 16 | 16.5 | 224 | 170 | 414 | 457 | 127 | 100 | 122 | 11 | 4.2 | 0.5 | 3.8 |
| 17 | 77 | 220 | 247 | 306 | 505 | 135 | 104 | 107 | 10.5 | 4.2 | 0.5 | 2.1 |
| 18 | 224 | 571 | 202 | 263 | 314 | 155 | 87 | 96 | 10 | 3.4 | 0.4 | 1.3 |
| 19 | 473 | 662 | 204 | 308 | 426 | 217 | 72 | 76 | 9.5 | 2.9 | 0.4 | 0.9 |
| 20 | 261 | 361 | 292 | 301 | 468 | 182 | 60 | 58 | 9.5 | 2.7 | 0.4 | 0.8 |
| 21 | 161 | 294 | 525 | 750 | 479 | 236 | 52 | 49 | 10 | 2.2 | 0.4 | 1.4 |
| 22 | 125 | 278 | 511 | 1,000 | 840 | 339 | 46 | 43 | 9.5 | 2.0 | 0.3 | 2.4 |
| 23 | 106 | 210 | 339 | 450 | 562 | 514 | 41 | 36 | 8.6 | 1.8 | 0.4 | 2.4 |
| 24 | 127 | 332 | 289 | 279 | 336 | 390 | 36 | 32 | 8.6 | 1.7 | 0.4 | 1.9 |
| 25 | 120 | 459 | 287 | 397 | 224 | 256 | 51 | 28 | 8.1 | 1.5 | 0.4 | 1.3 |
| 26 | 116 | 352 | 231 | 405 | 318 | 190 | 52 | 26 | 7.6 | 1.4 | 0.4 | 2.1 |
| 27 | 97 | 628 | 192 | 300 | 240 | 144 | 48 | 24 | 6.4 | 1.4 | 0.4 | 6.4 |
| 28 | 91 | 327 | 316 | 280 | 182 | 127 | 43 | 36 | 6.0 | 1.3 | 0.4 | 6.8 |
| 29 | 120 | 275 | 300 | 250 | | 132 | 37 | 43 | 11 | 1.5 | 0.4 | 7.2 |
| 30 | 129 | 255 | 254 | 480 | - | 166 | 33 | 38 | 12 | 1.4 | 0.5 | 5.6 |
| 31 | 122 | - | 218 | 400 | - | 182 | - | 35 | - | 1.4 | 0.5 | - |

Minimum daily discharge of Tahuya River near Belfair, for years 1945-56

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 21 | 14 | 24 | 15 | 9.5 | 2.0 | 0.2 | 0 | 0 |
| 2 | 0 | 0 | 0 | 20 | 14 | 23 | 14 | 9.0 | 1.7 | 0.2 | 0 | 0 |
| 3 | 0 | 0 | 0 | 18 | 16 | 24 | 12 | 8.6 | 1.6 | 0.2 | 0 | 0 |
| 4 | 0 | 0 | 2.7 | 17 | 14 | 22 | 12 | 7.7 | 1.6 | 0.2 | 0 | 0 |
| 5 | 0 | 0 | 13.5 | 17 | 13 | 21 | 12 | 7.7 | 1.6 | 0.2 | 0 | 0 |
| 6 | 0 | 0 | 13 | 17 | 14 | 19 | 12 | 7.3 | 1.6 | 0.2 | 0 | 0 |
| 7 | 0 | 0 | 12.5 | 16 | 14 | 19 | 11 | 6.9 | 1.6 | 0.2 | 0 | 0 |
| 8 | 0 | 0 | 12.5 | 16 | 20 | 20 | 19 | 6.9 | 1.3 | 0.2 | 0 | 0 |
| 9 | 0 | 0 | 12 | 16 | 27 | 20 | 18 | 6.4 | 1.1 | 0.2 | 0 | 0 |
| 10 | 0 | 0 | 11.5 | 23 | 26 | 19 | 16.5 | 5.6 | 1.1 | 0.2 | 0 | 0 |
| 11 | 0 | 0 | 15 | 28 | 25 | 22 | 16 | 5.6 | 1.1 | 0 | 0 | 0 |
| 12 | 0 | 0 | 15 | 31 | 24 | 23 | 15 | 5.3 | 1.1 | 0 | 0 | 0 |
| 13 | 0 | 0 | 27 | 31 | 23 | 21 | 14 | 5.3 | 1.1 | 0.2 | 0 | 0 |
| 14 | 0 | 0 | 25 | 26 | 20 | 19.5 | 11 | 4.5 | 0.9 | 0.2 | 0 | 0 |
| 15 | 0 | 0 | 24 | 25 | 19 | 19 | 10 | 4.5 | 0.9 | 0 | 0 | 0 |
| 16 | 0 | 0 | 23 | 23 | 18 | 17.5 | 9.4 | 4.1 | 0.9 | 0 | 0 | 0 |
| 17 | 0 | 0 | 23 | 22 | 17 | 16.5 | 8.9 | 3.8 | 0.7 | 0 | 0 | 0 |
| 18 | 0 | 0 | 29 | 26 | 16.5 | 17 | 9.9 | 3.8 | 0.7 | 0 | 0 | 0 |
| 19 | 0 | 0 | 27 | 24 | 18.5 | 16.5 | 10.5 | 4.6 | 0.6 | 0 | 0 | 0 |
| 20 | 0 | 0 | 25 | 23 | 27 | 16 | 9.7 | 4.5 | 0.4 | 0 | 0 | 0 |
| 21 | 0 | 0 | 28 | 22 | 26 | 25 | 9.3 | 3.8 | 0.4 | 0 | 0 | 0 |
| 22 | 0 | 0 | 25 | 23 | 26 | 23 | 8.9 | 3.5 | 0.2 | 0 | 0 | 0 |
| 23 | 0 | 0 | 26 | 21 | 24 | 20 | 8.1 | 2.9 | 0.2 | 0 | 0 | 0 |
| 24 | 0 | 0 | 32 | 19 | 22 | 19 | 7.7 | 2.9 | 0.2 | 0 | 0 | 0 |
| 25 | 0 | 0 | 29 | 20 | 26 | 18 | 7.3 | 2.9 | 0.2 | 0 | 0 | 0 |
| 26 | 0 | 0 | 28 | 18 | 23 | 17 | 6.5 | 2.9 | 0.2 | 0 | 0 | 0 |
| 27 | 0 | 0 | 29 | 17 | 22 | 15 | 6.2 | 2.6 | 0.2 | 0 | 0 | 0 |
| 28 | 0 | 0 | 28 | 16 | 25 | 14 | 6.6 | 2.3 | 0.2 | 0 | 0 | 0 |
| 29 | 0 | 0 | 25 | 16 | | 14 | 10.5 | 2.3 | 0.2 | 0 | 0 | 0 |
| 30 | 0 | 0 | 23 | 15 | - | 17 | 10 | 2.0 | 0.2 | 0 | 0 | 0 |
| 31 | 0 | - | 21 | 14 | - | 15 | - | 2.0 | - | 0 | 0 | - |

Table 20. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, DEWATTO CREEK NEAR DEWATTO

Maximum daily discharge of Dewatto Creek near Dewatto, for years 1947-54, 1958-60

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 38 | 228 | 385 | 154 | 498 | 147 | 224 | 193 | 48 | 30 | 17.5 | 19.5 |
| 2 | 51 | 167 | 495 | 430 | 326 | 140 | 147 | 128 | 45 | 25 | 17.5 | 17.5 |
| 3 | 30 | 126 | 293 | 535 | 288 | 221 | 116 | 100 | 44 | 23 | 17.5 | 18 |
| 4 | 26 | 100 | 326 | 447 | 374 | 330 | 101 | 104 | 42 | 24 | 18 | 30 |
| 5 | 28 | 80 | 286 | 931 | 272 | 348 | 134 | 104 | 40 | 24 | 18.5 | 24 |
| 6 | 28 | 68 | 187 | 773 | 260 | 267 | 115 | 153 | 37 | 27 | 20 | 18 |
| 7 | 38 | 60 | 237 | 525 | 486 | 183 | 92 | 127 | 36 | 25 | 19.5 | 24 |
| 8 | 28 | 59 | 214 | 439 | 508 | 152 | 117 | 105 | 34 | 24 | 18 | 16 |
| 9 | 25 | 49 | 210 | 536 | 1,000 | 206 | 117 | 91 | 33 | 23 | 18 | 18 |
| 10 | 85 | 68 | 286 | 346 | 720 | 220 | 94 | 82 | 31 | 28 | 18.5 | 15.5 |
| 11 | 55 | 143 | 208 | 380 | 391 | 151 | 81 | 74 | 36 | 23 | 18 | 16 |
| 12 | 38 | 239 | 341 | 394 | 283 | 127 | 83 | 79 | 36 | 23 | 18 | 16 |
| 13 | 30 | 193 | 203 | 299 | 703 | 144 | 81 | 115 | 37 | 21 | 18 | 15.5 |
| 14 | 54 | 164 | 214 | 222 | 436 | 124 | 104 | 158 | 36 | 21 | 17.5 | 19.5 |
| 15 | 62 | 167 | 572 | 237 | 475 | 133 | 120 | 146 | 32 | 21 | 23 | 51 |
| 16 | 76 | 274 | 347 | 406 | 639 | 182 | 138 | 116 | 31 | 21 | 22 | 28 |
| 17 | 149 | 239 | 310 | 281 | 668 | 175 | 154 | 102 | 32 | 19.5 | 21 | 26 |
| 18 | 334 | 149 | 292 | 241 | 399 | 217 | 120 | 88 | 31 | 20 | 19.5 | 26 |
| 19 | 521 | 133 | 261 | 298 | 516 | 279 | 119 | 79 | 30 | 22 | 20 | 22 |
| 20 | 239 | 816 | 371 | 308 | 558 | 221 | 291 | 70 | 31 | 21 | 18 | 29 |
| 21 | 140 | 717 | 270 | 740 | 564 | 219 | 226 | 63 | 31 | 22 | 20 | 22 |
| 22 | 98 | 450 | 248 | 780 | 1,330 | 268 | 144 | 60 | 30 | 19.5 | 20 | 23 |
| 23 | 90 | 370 | 259 | 426 | 760 | 173 | 113 | 56 | 30 | 21 | 22 | 22 |
| 24 | 138 | 209 | 291 | 556 | 380 | 195 | 108 | 51 | 28 | 19.5 | 23 | 18.5 |
| 25 | 133 | 348 | 216 | 498 | 318 | 177 | 94 | 49 | 28 | 18.5 | 20 | 18 |
| 26 | 95 | 573 | 226 | 406 | 524 | 152 | 86 | 47 | 28 | 18 | 19 | 28 |
| 27 | 73 | 1,040 | 332 | 274 | 299 | 143 | 76 | 47 | 27 | 18.5 | 19 | 37 |
| 28 | 111 | 377 | 433 | 261 | 195 | 120 | 70 | 72 | 26 | 20 | 18.5 | 32 |
| 29 | 143 | 270 | 410 | 827 | | 154 | 192 | 62 | 24 | 18.5 | 17.5 | 30 |
| 30 | 123 | 243 | 254 | 726 | - | 272 | 408 | 58 | 24 | 18 | 19 | 43 |
| 31 | 106 | - | 179 | 522 | - | 239 | - | 51 | - | 17 | 19.5 | - |

Minimum daily discharge of Dewatto Creek near Dewatto, for years 1947-54, 1958-60

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.5 | 13.5 | 20 | 53 | 29 | 52 | 42 | 37 | 23 | 15 | 13 | 12 |
| 2 | 11.5 | 13 | 24 | 49 | 29 | 49 | 50 | 36 | 23 | 15 | 13 | 12 |
| 3 | 11.5 | 13 | 28 | 46 | 29 | 51 | 51 | 34 | 22 | 15 | 13 | 12 |
| 4 | 11.5 | 12.5 | 25 | 43 | 29 | 49 | 50 | 33 | 22 | 15 | 13 | 12 |
| 5 | 11 | 13 | 24 | 42 | 28 | 47 | 47 | 31 | 22 | 15 | 13 | 11.5 |
| 6 | 11.5 | 12.5 | 24 | 43 | 29 | 46 | 45 | 31 | 22 | 15 | 13 | 12 |
| 7 | 11.5 | 12.5 | 24 | 49 | 28 | 45 | 44 | 32 | 21 | 15 | 13 | 11.5 |
| 8 | 11.5 | 12.5 | 24 | 47 | 30 | 44 | 42 | 32 | 21 | 15 | 13 | 11.5 |
| 9 | 12 | 13 | 23 | 43 | 35 | 43 | 40 | 30 | 21 | 14 | 13 | 11.5 |
| 10 | 12 | 16 | 25 | 42 | 60 | 42 | 40 | 28 | 21 | 14 | 13 | 10 |
| 11 | 12 | 16 | 29 | 42 | 56 | 46 | 39 | 28 | 21 | 16 | 13 | 9.6 |
| 12 | 12 | 16 | 26 | 41 | 52 | 45 | 39 | 27 | 21 | 15 | 14 | 10 |
| 13 | 12 | 16 | 39 | 39 | 50 | 43 | 40 | 26 | 21 | 16 | 13 | 10 |
| 14 | 11.5 | 16 | 37 | 45 | 70 | 42 | 39 | 26 | 20 | 16 | 13 | 10 |
| 15 | 11.5 | 17 | 37 | 45 | 70 | 40 | 36 | 26 | 19.5 | 15 | 13 | 10 |
| 16 | 12 | 17 | 36 | 42 | 74 | 39 | 36 | 26 | 19.5 | 16 | 12.5 | 11 |
| 17 | 12 | 16 | 43 | 41 | 69 | 38 | 36 | 27 | 19.5 | 15 | 12 | 10 |
| 18 | 12 | 15 | 43 | 41 | 66 | 42 | 35 | 27 | 19.5 | 14 | 12 | 11.5 |
| 19 | 12 | 14.5 | 40 | 40 | 62 | 38 | 35 | 28 | 19.5 | 15 | 12 | 11 |
| 20 | 12.5 | 14.5 | 39 | 40 | 60 | 37 | 34 | 28 | 19.5 | 15 | 11.5 | 11 |
| 21 | 13 | 14 | 37 | 39 | 59 | 60 | 33 | 27 | 18 | 15 | 11.5 | 10.5 |
| 22 | 12.5 | 14 | 36 | 41 | 56 | 58 | 32 | 26 | 18 | 15 | 11.5 | 10 |
| 23 | 12.5 | 14 | 63 | 40 | 55 | 55 | 31 | 25 | 18 | 15 | 11.5 | 10.5 |
| 24 | 13 | 14 | 55 | 38 | 54 | 53 | 31 | 24 | 18 | 15 | 11.5 | 11 |
| 25 | 13 | 13.5 | 48 | 40 | 63 | 50 | 31 | 24 | 18 | 15 | 11.5 | 11.5 |
| 26 | 12.5 | 13.5 | 43 | 36 | 60 | 49 | 31 | 24 | 18 | 15 | 11.5 | 11.5 |
| 27 | 12.5 | 13.5 | 42 | 33 | 57 | 49 | 37 | 23 | 18 | 15 | 13 | 11 |
| 28 | 12.5 | 13.5 | 46 | 32 | 54 | 46 | 35 | 23 | 17.5 | 14.5 | 13 | 11.5 |
| 29 | 13 | 13.5 | 63 | 31 | | 45 | 34 | 23 | 17 | 14 | 13 | 11.5 |
| 30 | 14 | 14.5 | 58 | 31 | - | 44 | 38 | 23 | 17 | 13 | 13 | 11.5 |
| 31 | 14 | - | 57 | 30 | - | 43 | - | 23 | - | 13 | 12.5 | - |

Table 21. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, DOGFISH CREEK NEAR POULSBO

Maximum daily discharge of Dogfish Creek near Poulsbo, for years 1947-60

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.4 | 17 | 42 | 64 | 43 | 20 | 30 | 9.6 | 7.7 | 16 | 4.1 | 5.3 |
| 2 | 10 | 43 | 22 | 62 | 36 | 19 | 20 | 8.6 | 6.2 | 7.0 | 7.3 | 4.9 |
| 3 | 6.5 | 64 | 47 | 53 | 21 | 22 | 15 | 16 | 10 | 5.6 | 5.1 | 4.9 |
| 4 | 7.6 | 32 | 45 | 93 | 20 | 44 | 16 | 10.5 | 12.5 | 7.1 | 4.2 | 6.4 |
| 5 | 7.1 | 14 | 36 | 100 | 25 | 59 | 14 | 12 | 8.2 | 5.4 | 4.2 | 5.6 |
| 6 | 6.6 | 10 | 27 | 99 | 42 | 25 | 19 | 14 | 10.5 | 5.1 | 3.9 | 4.9 |
| 7 | 7.9 | 10 | 36 | 67 | 44 | 32 | 13 | 8.3 | 10.5 | 4.8 | 4.2 | 5.4 |
| 8 | 21 | 8.6 | 29 | 74 | 57 | 37 | 18 | 7.1 | 11.5 | 4.8 | 3.9 | 5.8 |
| 9 | 11.5 | 10.5 | 38 | 74 | 72 | 43 | 12.5 | 8.2 | 10.5 | 4.8 | 3.9 | 4.3 |
| 10 | 11.5 | 11.5 | 25 | 28 | 41 | 30 | 13 | 8.2 | 13 | 5.1 | 3.8 | 4.5 |
| 11 | 8.0 | 23 | 22 | 57 | 26 | 20 | 9.5 | 9.9 | 8.8 | 4.6 | 4.1 | 6.5 |
| 12 | 6.8 | 19.5 | 28 | 31 | 80 | 23 | 22 | 15 | 6.8 | 4.1 | 4.1 | 5.1 |
| 13 | 14 | 20 | 18 | 26 | 100 | 15.5 | 14 | 16 | 6.4 | 4.1 | 3.8 | 4.9 |
| 14 | 15.5 | 21 | 25 | 44 | 49 | 27 | 22 | 13 | 6.0 | 4.2 | 4.7 | 4.9 |
| 15 | 14 | 30 | 47 | 51 | 62 | 30 | 18 | 20 | 6.5 | 4.4 | 5.3 | 9.5 |
| 16 | 9.5 | 38 | 29 | 65 | 90 | 34 | 12.5 | 13 | 8.0 | 5.5 | 5.6 | 6.0 |
| 17 | 18 | 22 | 27 | 53 | 82 | 26 | 24 | 12 | 9.9 | 4.4 | 5.3 | 13.5 |
| 18 | 34 | 38 | 42 | 35 | 56 | 33 | 13.5 | 13.5 | 5.8 | 3.9 | 4.9 | 8.1 |
| 19 | 26 | 58 | 20 | 30 | 79 | 24 | 18 | 9.8 | 7.0 | 4.2 | 5.7 | 11 |
| 20 | 16.5 | 40 | 150 | 54 | 52 | 20 | 24 | 8.3 | 6.2 | 4.0 | 4.7 | 6.4 |
| 21 | 8.8 | 35 | 118 | 77 | 107 | 25 | 13.5 | 8.5 | 5.8 | 4.2 | 5.7 | 6.4 |
| 22 | 9.5 | 17 | 83 | 68 | 150 | 19 | 14 | 10.5 | 5.3 | 4.3 | 6.0 | 5.3 |
| 23 | 24 | 17 | 39 | 39 | 145 | 62 | 12.5 | 7.3 | 7.5 | 4.8 | 6.6 | 5.7 |
| 24 | 14 | 49 | 56 | 50 | 93 | 24 | 11 | 7.2 | 6.1 | 5.3 | 6.2 | 5.6 |
| 25 | 15 | 31 | 50 | 33 | 72 | 21 | 11 | 7.0 | 4.9 | 3.6 | 5.6 | 5.3 |
| 26 | 8.6 | 41 | 40 | 24 | 77 | 19 | 15 | 12 | 5.8 | 5.6 | 9.2 | 12 |
| 27 | 9.1 | 41 | 32 | 25 | 32 | 16.5 | 9.9 | 16 | 5.6 | 5.4 | 6.0 | 8.2 |
| 28 | 10.5 | 42 | 27 | 43 | 37 | 20 | 9.2 | 41 | 6.9 | 4.4 | 5.6 | 11 |
| 29 | 12.5 | 23 | 30 | 121 | | 32 | 13 | 35 | 7.1 | 4.4 | 5.6 | 6.6 |
| 30 | 15 | 35 | 25 | 44 | - | 30 | 18 | 19 | 6.9 | 4.6 | 5.3 | 12 |
| 31 | 15 | - | 31 | 47 | - | 40 | - | 11 | - | 4.4 | 5.6 | - |

Minimum daily discharge of Dogfish Creek near Poulsbo, for years 1947-60

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.0 | 4.2 | 5.5 | 6.0 | 5.3 | 5.8 | 5.8 | 4.9 | 3.4 | 2.5 | 1.6 | 2.5 |
| 2 | 3.1 | 4.3 | 5.5 | 6.0 | 5.5 | 5.6 | 6.1 | 4.7 | 3.4 | 2.7 | 1.9 | 2.6 |
| 3 | 2.9 | 4.3 | 5.8 | 5.5 | 5.7 | 5.6 | 5.6 | 4.6 | 3.3 | 2.7 | 1.9 | 2.6 |
| 4 | 2.9 | 4.2 | 5.2 | 5.3 | 5.8 | 5.6 | 5.3 | 4.4 | 3.3 | 2.7 | 2.4 | 2.6 |
| 5 | 2.9 | 4.2 | 4.8 | 5.1 | 6.0 | 5.6 | 5.1 | 4.4 | 3.2 | 2.6 | 2.4 | 2.6 |
| 6 | 2.9 | 4.2 | 4.8 | 5.5 | 5.2 | 5.6 | 5.1 | 4.2 | 3.2 | 2.6 | 1.9 | 2.6 |
| 7 | 2.9 | 4.2 | 6.0 | 5.1 | 6.4 | 5.6 | 5.1 | 4.1 | 3.2 | 2.6 | 1.6 | 2.9 |
| 8 | 3.1 | 3.3 | 5.1 | 4.8 | 6.6 | 5.6 | 4.8 | 3.7 | 3.2 | 2.5 | 1.6 | 3.1 |
| 9 | 3.3 | 4.3 | 4.8 | 4.6 | 8.2 | 5.4 | 4.8 | 3.7 | 3.3 | 2.4 | 1.4 | 2.8 |
| 10 | 3.4 | 4.8 | 5.8 | 5.3 | 7.7 | 5.4 | 4.6 | 3.7 | 3.1 | 1.6 | 2.2 | 2.8 |
| 11 | 3.6 | 5.0 | 5.4 | 5.4 | 7.4 | 5.6 | 4.6 | 3.6 | 3.2 | 1.6 | 2.4 | 2.8 |
| 12 | 3.8 | 5.1 | 5.4 | 5.1 | 6.9 | 5.6 | 4.6 | 3.6 | 3.2 | 2.2 | 2.4 | 2.9 |
| 13 | 3.8 | 5.0 | 5.8 | 5.2 | 6.9 | 5.5 | 5.4 | 3.6 | 3.1 | 2.4 | 2.3 | 2.8 |
| 14 | 3.4 | 5.4 | 5.8 | 4.8 | 7.4 | 5.2 | 5.3 | 3.5 | 3.0 | 1.9 | 2.2 | 2.7 |
| 15 | 3.6 | 4.8 | 5.8 | 6.0 | 6.8 | 5.1 | 5.1 | 3.6 | 3.1 | 2.2 | 2.4 | 2.7 |
| 16 | 3.8 | 4.8 | 6.8 | 5.6 | 6.5 | 5.2 | 5.1 | 3.8 | 3.1 | 2.4 | 2.5 | 2.7 |
| 17 | 3.8 | 4.3 | 6.1 | 5.3 | 6.4 | 5.1 | 4.8 | 3.5 | 3.1 | 2.4 | 2.5 | 2.9 |
| 18 | 3.8 | 3.7 | 5.3 | 5.0 | 6.1 | 6.1 | 4.6 | 3.5 | 3.0 | 2.2 | 2.5 | 2.7 |
| 19 | 3.8 | 3.6 | 5.1 | 5.6 | 6.4 | 5.7 | 4.3 | 3.8 | 2.8 | 2.2 | 2.5 | 2.7 |
| 20 | 4.4 | 3.5 | 4.8 | 5.2 | 6.4 | 5.8 | 4.3 | 3.9 | 2.8 | 2.2 | 2.5 | 2.8 |
| 21 | 4.4 | 3.4 | 6.0 | 5.6 | 6.2 | 5.6 | 4.3 | 3.8 | 3.0 | 2.3 | 2.4 | 2.7 |
| 22 | 4.3 | 4.3 | 6.0 | 5.6 | 6.1 | 5.3 | 4.3 | 3.7 | 2.8 | 2.4 | 2.5 | 2.7 |
| 23 | 4.4 | 4.0 | 5.6 | 5.6 | 6.0 | 6.4 | 4.3 | 3.7 | 2.8 | 2.4 | 2.5 | 2.8 |
| 24 | 4.5 | 4.0 | 4.8 | 5.6 | 6.0 | 6.1 | 4.3 | 3.6 | 2.4 | 2.4 | 2.4 | 2.8 |
| 25 | 4.3 | 4.0 | 4.3 | 5.6 | 6.0 | 6.6 | 4.3 | 3.6 | 2.8 | 2.4 | 2.4 | 2.9 |
| 26 | 4.2 | 4.0 | 4.3 | 5.5 | 5.8 | 6.4 | 4.3 | 3.3 | 2.8 | 2.4 | 2.4 | 2.9 |
| 27 | 4.3 | 4.0 | 5.3 | 5.2 | 6.0 | 6.1 | 4.5 | 3.2 | 3.1 | 2.7 | 2.4 | 2.8 |
| 28 | 4.3 | 4.0 | 5.8 | 5.0 | 6.0 | 6.6 | 4.8 | 3.2 | 3.0 | 2.6 | 2.5 | 2.9 |
| 29 | 4.5 | 4.0 | 5.8 | 5.1 | | 6.4 | 4.7 | 3.1 | 3.0 | 2.4 | 2.7 | 2.9 |
| 30 | 4.3 | 5.5 | 5.5 | 4.6 | - | 6.1 | 4.8 | 3.1 | 2.8 | 1.4 | 3.0 | 2.9 |
| 31 | 4.2 | - | 5.5 | 4.6 | - | 5.8 | - | 3.0 | - | 1.2 | 2.7 | - |

Table 22. MAXIMUM-MINIMUM DAILY DISCHARGE RECORDS, HUGE CREEK NEAR WAUNA

Maximum daily discharge of Huge Creek near Wauna, for years 1947-60

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.4 | 12 | 40 | 35 | 82 | 24 | 30 | 48 | 8.3 | 8.7 | 5.8 | 5.4 |
| 2 | 8.9 | 21 | 49 | 45 | 56 | 26 | 25 | 29 | 8.0 | 6.6 | 7.6 | 5.4 |
| 3 | 7.3 | 53 | 32 | 50 | 57 | 74 | 20 | 20 | 11 | 7.0 | 6.8 | 5.4 |
| 4 | 7.1 | 62 | 24 | 89 | 63 | 118 | 18.5 | 16.5 | 9.2 | 6.4 | 6.3 | 6.2 |
| 5 | 8.6 | 32 | 30 | 111 | 40 | 97 | 18 | 14 | 7.9 | 7.4 | 5.6 | 5.5 |
| 6 | 6.5 | 22 | 35 | 120 | 39 | 65 | 16.5 | 23 | 8.6 | 7.1 | 5.6 | 5.6 |
| 7 | 6.8 | 16 | 40 | 96 | 59 | 46 | 17.5 | 18.5 | 9.6 | 6.5 | 6.6 | 5.8 |
| 8 | 8.1 | 13.5 | 35 | 74 | 61 | 46 | 15.5 | 15.5 | 11 | 6.4 | 6.3 | 5.4 |
| 9 | 9.6 | 11 | 60 | 53 | 250 | 44 | 15.5 | 12.5 | 13.5 | 6.6 | 5.8 | 5.4 |
| 10 | 16 | 10 | 87 | 60 | 173 | 42 | 13.5 | 12.5 | 12.5 | 6.3 | 5.5 | 5.5 |
| 11 | 8.3 | 13 | 74 | 58 | 104 | 33 | 14 | 11 | 9.6 | 6.2 | 6.1 | 6.8 |
| 12 | 7.1 | 16 | 67 | 82 | 78 | 28 | 17.5 | 13.5 | 8.2 | 6.0 | 5.4 | 5.4 |
| 13 | 7.6 | 12 | 37 | 72 | 90 | 30 | 17.5 | 15 | 7.9 | 6.3 | 5.4 | 5.4 |
| 14 | 11.5 | 10.5 | 26 | 47 | 65 | 26 | 17 | 13 | 8.2 | 7.9 | 5.4 | 5.7 |
| 15 | 17 | 10.5 | 162 | 51 | 70 | 34 | 19.5 | 13.5 | 8.2 | 7.4 | 5.8 | 6.0 |
| 16 | 11 | 13 | 79 | 59 | 60 | 28 | 22 | 11.5 | 7.9 | 6.8 | 5.6 | 5.7 |
| 17 | 13.5 | 17 | 38 | 67 | 68 | 44 | 21 | 11 | 7.6 | 6.6 | 5.6 | 8.1 |
| 18 | 15 | 32 | 31 | 42 | 43 | 49 | 17 | 11 | 7.6 | 6.3 | 5.6 | 6.4 |
| 19 | 17.5 | 67 | 36 | 56 | 86 | 58 | 17 | 9.9 | 8.2 | 6.3 | 5.6 | 7.8 |
| 20 | 13 | 36 | 77 | 57 | 90 | 46 | 29 | 11 | 7.6 | 6.1 | 5.6 | 7.2 |
| 21 | 10 | 43 | 117 | 200 | 119 | 41 | 24 | 9.6 | 7.4 | 6.1 | 5.6 | 6.7 |
| 22 | 10.5 | 42 | 124 | 140 | 90 | 51 | 18.5 | 9.0 | 7.2 | 5.8 | 5.6 | 7.1 |
| 23 | 10.5 | 34 | 75 | 89 | 68 | 56 | 17 | 8.6 | 7.2 | 5.8 | 6.6 | 7.9 |
| 24 | 8.6 | 41 | 59 | 130 | 50 | 62 | 18 | 9.0 | 7.2 | 5.8 | 6.0 | 7.1 |
| 25 | 12.5 | 57 | 46 | 72 | 63 | 45 | 16.5 | 9.2 | 7.2 | 5.8 | 5.6 | 7.5 |
| 26 | 7.9 | 58 | 36 | 57 | 78 | 35 | 15 | 12.5 | 7.2 | 5.8 | 5.5 | 6.8 |
| 27 | 8.1 | 57 | 32 | 49 | 46 | 30 | 13.5 | 10.5 | 6.6 | 5.8 | 6.0 | 6.7 |
| 28 | 15 | 37 | 54 | 57 | 31 | 26 | 19.5 | 13.5 | 6.8 | 6.1 | 5.8 | 7.9 |
| 29 | 10 | 29 | 61 | 152 | | 30 | 55 | 10.5 | 6.8 | 5.8 | 5.4 | 7.6 |
| 30 | 12.5 | 32 | 41 | 80 | - | 35 | 149 | 10 | 6.8 | 5.8 | 5.4 | 11 |
| 31 | 10 | - | 35 | 100 | - | 35 | - | 9.3 | - | 5.6 | 5.4 | -- |

Minimum daily discharge of Huge Creek near Wauna, for years 1947-60

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.0 | 4.2 | 4.2 | 5.2 | 5.7 | 9.2 | 7.1 | 5.8 | 4.6 | 4.4 | 3.9 | 3.6 |
| 2 | 4.0 | 4.2 | 4.4 | 7.1 | 5.7 | 9.2 | 7.7 | 5.8 | 4.6 | 4.4 | 3.8 | 3.6 |
| 3 | 4.0 | 4.0 | 4.6 | 7.1 | 5.7 | 8.9 | 7.4 | 5.4 | 4.6 | 4.4 | 3.8 | 3.5 |
| 4 | 4.0 | 4.0 | 4.7 | 6.8 | 6.4 | 8.9 | 6.8 | 5.2 | 4.5 | 4.4 | 3.6 | 3.5 |
| 5 | 4.0 | 4.0 | 4.7 | 7.5 | 6.0 | 8.6 | 6.8 | 5.0 | 4.3 | 4.2 | 3.8 | 3.5 |
| 6 | 4.0 | 3.8 | 4.7 | 7.1 | 5.4 | 8.6 | 6.6 | 4.8 | 4.6 | 4.2 | 4.2 | 3.6 |
| 7 | 4.0 | 3.8 | 4.7 | 7.7 | 5.4 | 8.6 | 6.4 | 4.8 | 4.4 | 4.2 | 4.2 | 3.6 |
| 8 | 4.0 | 4.0 | 4.7 | 8 | 6.4 | 8.6 | 6.4 | 4.8 | 4.4 | 4.2 | 4.0 | 3.9 |
| 9 | 4.0 | 3.8 | 4.7 | 10 | 8.4 | 8.2 | 6.4 | 4.6 | 4.4 | 4.2 | 4.0 | 3.6 |
| 10 | 4.0 | 4.8 | 4.8 | 9.3 | 9.3 | 8.4 | 6.4 | 4.6 | 4.2 | 4.2 | 4.0 | 3.6 |
| 11 | 4.0 | 4.8 | 4.8 | 8.4 | 8.4 | 7.9 | 6.4 | 4.6 | 4.5 | 4.5 | 4.2 | 3.9 |
| 12 | 3.8 | 4.4 | 4.6 | 7.9 | 7.5 | 7.9 | 6.4 | 4.6 | 4.5 | 4.3 | 3.9 | 3.9 |
| 13 | 3.6 | 4.6 | 5.6 | 7.9 | 7.1 | 7.1 | 6.4 | 4.6 | 4.4 | 4.3 | 3.9 | 3.9 |
| 14 | 3.6 | 5.0 | 4.8 | 7.9 | 8.5 | 7.1 | 6.4 | 4.6 | 4.4 | 4.3 | 4.1 | 3.9 |
| 15 | 3.6 | 4.8 | 4.6 | 7.5 | 9.6 | 7.1 | 6.1 | 4.6 | 4.3 | 4.1 | 4.1 | 4.0 |
| 16 | 3.8 | 4.4 | 4.4 | 7.5 | 9.2 | 7.5 | 6.1 | 4.6 | 4.1 | 4.1 | 4.2 | 4.0 |
| 17 | 3.8 | 4.2 | 4.2 | 7.0 | 8.7 | 7.1 | 6.1 | 4.6 | 4.1 | 4.1 | 4.2 | 4.2 |
| 18 | 3.8 | 4.0 | 4.2 | 7.5 | 8.3 | 8.4 | 6.1 | 4.6 | 4.1 | 4.2 | 3.9 | 4.2 |
| 19 | 3.8 | 3.8 | 4.2 | 7.1 | 8.0 | 7.1 | 5.6 | 4.6 | 4.1 | 4.2 | 3.9 | 4.2 |
| 20 | 4.0 | 3.8 | 4.2 | 7.1 | 8.0 | 7.1 | 5.6 | 4.8 | 4.1 | 4.2 | 3.9 | 4.2 |
| 21 | 4.0 | 4.0 | 5.2 | 7.1 | 8.0 | 8.3 | 5.6 | 4.8 | 4.1 | 4.2 | 3.9 | 4.0 |
| 22 | 4.0 | 4.0 | 5.2 | 6.7 | 8.0 | 8.0 | 5.4 | 4.8 | 4.1 | 4.1 | 3.9 | 4.0 |
| 23 | 4.0 | 4.0 | 4.6 | 6.7 | 8.0 | 8.3 | 5.4 | 4.6 | 4.1 | 4.1 | 4.2 | 4.0 |
| 24 | 4.2 | 4.0 | 4.2 | 6.7 | 10 | 8.2 | 5.0 | 4.6 | 4.6 | 4.1 | 4.2 | 4.2 |
| 25 | 4.2 | 4.0 | 4.0 | 6.4 | 9.2 | 8.2 | 5.0 | 4.6 | 4.6 | 4.0 | 4.2 | 4.0 |
| 26 | 4.4 | 3.8 | 4.0 | 6.0 | 8.6 | 8.0 | 5.0 | 4.6 | 4.6 | 4.0 | 3.9 | 4.0 |
| 27 | 4.2 | 3.8 | 4.0 | 6.0 | 8.5 | 7.7 | 6.1 | 4.6 | 4.8 | 4.0 | 4.0 | 4.0 |
| 28 | 4.2 | 4.0 | 4.6 | 5.7 | 9.6 | 7.7 | 5.6 | 4.6 | 4.8 | 4.0 | 4.1 | 3.9 |
| 29 | 4.4 | 3.8 | 5.8 | 6.0 | | 8.0 | 5.6 | 4.6 | 4.8 | 4.0 | 3.9 | 3.9 |
| 30 | 4.4 | 4.0 | 5.8 | 6.0 | - | 8.0 | 6.8 | 4.6 | 4.6 | 3.7 | 3.6 | 4.0 |
| 31 | 4.4 | - | 5.6 | 5.7 | - | 7.7 | - | 4.6 | - | 4.0 | 3.6 | - |

Table 23. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1946-59 UNION RIVER NEAR BREMERTON.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 1,140 | 2,800 | 2,620 | 4,830 | 2,910 | 2,010 | 1,180 | 1,000 | 660 | 914 | 736 | 1,130 |
| Minimum | 36 | 58 | 308 | 361 | 291 | 541 | 260 | 105 | 70 | 39 | 28 | 30 |
| Average | 367 | 1,240 | 1,373 | 1,689 | 1,470 | 911 | 576 | 370 | 242 | 230 | 179 | 193 |

Table 24. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1946-59 UNION RIVER NEAR BREMERTON.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 45 | 24 | 16 | 9.0 | 5.7 | 3.8 | 2.6 | 1.7 | 1.2 | 0.9 | 0.7 | 0.6 | 0.5 |
| November | 140 | 64 | 47 | 33 | 24 | 17 | 12 | 8.5 | 5.4 | 3.0 | 1.4 | 0.9 | 0.6 |
| December | 90 | 58 | 47 | 35 | 28 | 22 | 17 | 13.5 | 10.5 | 7.4 | 4.6 | 3.0 | 1.2 |
| January | 160 | 95 | 70 | 44 | 30 | 19 | 14.5 | 11.5 | 9.5 | 8.0 | 6.0 | 4.0 | 1.8 |
| February | 170 | 87 | 60 | 36 | 25 | 19 | 15.5 | 12.5 | 10.5 | 8.5 | 6.5 | 5.0 | 3.0 |
| March | 60 | 37 | 30 | 21 | 16 | 13 | 10.6 | 9.3 | 8.0 | 7.0 | 6.0 | 5.4 | 4.7 |
| April | 45 | 22 | 16.5 | 12 | 9.6 | 8.4 | 7.4 | 6.6 | 5.8 | 5.0 | 4.2 | 3.7 | 3.0 |
| May | 31 | 19 | 14 | 9.0 | 6.0 | 4.6 | 3.7 | 3.2 | 2.8 | 2.4 | 1.8 | 1.4 | 0.7 |
| June | 15 | 13 | 11 | 7.4 | 4.2 | 2.9 | 2.3 | 2.0 | 1.8 | 1.5 | 1.2 | 0.9 | 0.6 |
| July | 20 | 15.5 | 13 | 8.0 | 2.2 | 1.6 | 1.3 | 1.1 | 1.0 | 0.9 | 0.8 | 0.7 | 0.6 |
| August | 15 | 12.5 | 10 | 6.0 | 1.4 | 1.0 | 0.9 | 0.8 | 0.7 | 0.6 | 0.5 | 0.5 | 0.4 |
| September | 25 | 17 | 12.5 | 6.0 | 1.4 | 1.0 | 0.8 | 0.7 | 0.6 | 0.6 | 0.5 | 0.5 | 0.4 |
| Period | 100 | 45 | 30 | 17 | 12 | 9.0 | 6.6 | 4.3 | 2.2 | 1.3 | 0.8 | 0.6 | 0.4 |

Table 25. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1947-59 UNION RIVER NEAR BELFAIR.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 4,110 | 8,650 | 9,310 | 15,400 | 10,770 | 8,230 | 3,980 | 3,560 | 2,240 | 1,640 | 1,480 | 1,510 |
| Minimum | 1,200 | 1,040 | 3,050 | 2,370 | 3,050 | 2,610 | 2,020 | 1,680 | 1,330 | 1,140 | 995 | 924 |
| Average | 2,085 | 3,885 | 5,396 | 6,753 | 6,227 | 1,413 | 2,990 | 2,327 | 1,703 | 1,413 | 1,241 | 1,209 |

Table 26. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1948-59 UNION RIVER NEAR BELFAIR.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 150 | 81 | 59 | 39 | 30 | 26.5 | 24 | 22 | 21 | 20 | 19 | 18 | 15.8 |
| November | 540 | 180 | 135 | 88 | 61 | 47 | 38 | 31.5 | 27 | 23 | 19.8 | 17.8 | 15.8 |
| December | 360 | 210 | 160 | 121 | 100 | 84 | 72 | 60 | 50 | 41 | 31.5 | 26 | 19 |
| January | 480 | 315 | 235 | 160 | 120 | 90 | 70 | 57 | 48 | 41 | 36 | 32 | 28 |
| February | 690 | 310 | 210 | 145 | 115 | 92 | 75 | 63 | 53 | 44 | 36.5 | 32.5 | 28 |
| March | 260 | 155 | 125 | 93 | 73 | 62 | 55 | 49 | 45 | 42 | 38 | 36 | 33 |
| April | 125 | 88 | 72 | 58 | 51 | 47 | 44 | 42 | 40 | 38 | 36 | 34 | 31 |
| May | 108 | 67 | 48 | 41 | 38 | 37 | 36 | 34 | 32 | 30 | 28 | 26.5 | 24 |
| June | 50 | 35.5 | 34 | 32.5 | 31 | 30 | 29 | 28 | 26.5 | 25 | 23.7 | 22.7 | 21 |
| July | 33 | 29 | 28 | 26.5 | 25.5 | 25 | 24 | 23 | 22 | 20.5 | 19 | 18 | 17 |
| August | 28 | 25 | 24.3 | 23.2 | 23 | 22.2 | 21.5 | 20.8 | 19 | 17.8 | 16.4 | 15.8 | 14.8 |
| September | 47 | 28.5 | 25 | 23.5 | 22.5 | 21.5 | 20.5 | 19.5 | 18 | 17 | 15.8 | 15 | 14.7 |
| Period | 340 | 160 | 110 | 68 | 51 | 41 | 34.5 | 29 | 25.5 | 22.5 | 19.5 | 17.8 | 15.8 |

Table 27. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1945-53 MISSION CREEK NEAR BREMERTON.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 350 | 1,080 | 1,520 | 2,310 | 1,270 | 1,190 | 773 | 601 | 203 | 51 | 20 | 28 |
| Minimum | 0 | 0 | 496 | 382 | 630 | 269 | 170 | 41 | 16 | 0 | 0 | 0 |
| Average | 96.275 | 474 | 932 | 1,095 | 1,018 | 596 | 332 | 179 | 59.53 | 19.24 | 2.682 | 3.455 |

Table 28. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1946-53 MISSION CREEK NEAR BREMERTON.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 22 | 8.8 | 5.8 | 1.6 | 1.0 | 0.6 | 0.2 | 0.1 | 0 | 0 | 0 | 0 | 0 |
| November | 50 | 32 | 23 | 14 | 9.0 | 6.4 | 4.2 | 2.5 | 1.2 | 0.6 | 0 | 0 | 0 |
| December | 50 | 36 | 31 | 24 | 20 | 15.5 | 12 | 9.7 | 8.0 | 6.8 | 5.3 | 4.0 | 1.5 |
| January | 68 | 47 | 38 | 30 | 23 | 17.5 | 12.5 | 9.3 | 7.2 | 5.7 | 4.6 | 4.1 | 3.5 |
| February | 100 | 47 | 38 | 28 | 22 | 18 | 14.5 | 11.5 | 9.0 | 6.2 | 4.4 | 3.7 | 3.0 |
| March | 34 | 22 | 18 | 14 | 11.5 | 9.6 | 8.0 | 6.7 | 5.6 | 4.8 | 4.2 | 4.0 | 3.6 |
| April | 29 | 12.5 | 8.8 | 7.0 | 6.2 | 5.4 | 4.8 | 4.2 | 3.6 | 3.0 | 2.4 | 2.0 | 1.0 |
| May | 15 | 11 | 7.2 | 3.6 | 2.8 | 2.4 | 2.0 | 1.7 | 1.4 | 1.0 | 0.6 | 0.4 | 0.1 |
| June | 5.4 | 3.5 | 2.3 | 1.2 | 1.0 | 0.8 | 0.6 | 0.5 | 0.4 | 0.3 | 0.1 | 0 | 0 |
| July | 1.5 | 1.2 | 1.0 | 0.7 | 0.5 | 0.3 | 0.2 | 0.1 | 0.1 | 0 | 0 | 0 | 0 |
| August | 0.4 | 0.4 | 0.3 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| September | 1.0 | 0.6 | 0.3 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Period | 47 | 32 | 20 | 11 | 7.3 | 4.5 | 2.5 | 1.1 | 0.4 | 0 | 0 | 0 | 0 |

Table 29. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1946-53 MISSION CREEK NEAR BELFAIR.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 715 | 1,780 | 3,090 | 5,640 | 3,100 | 2,130 | 1,220 | 1,080 | 252 | 56 | 36 | 34 |
| Minimum | 13 | 22 | 1,070 | 582 | 1,180 | 608 | 207 | 63 | 28 | 14 | 13 | 6.1 |
| Average | 162 | 857 | 1,822 | 2,219 | 2,076 | 1,068 | 526 | 276 | 74 | 36 | 25 | 18.728 |

Table 30. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1946-53 MISSION CREEK NEAR BELFAIR.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 50 | 16 | 11 | 0.9 | 0.7 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 |
| November | 100 | 59 | 43 | 27 | 19 | 14 | 10 | 5.5 | 1.3 | 0.7 | 0.5 | 0.4 | 0.3 |
| December | 90 | 70 | 63 | 50 | 41 | 33 | 27 | 21 | 16 | 12 | 7.2 | 4.1 | 2.5 |
| January | 140 | 80 | 66 | 46 | 32 | 23 | 19 | 15 | 12.5 | 9.0 | 4.3 | 2.8 | 2.0 |
| February | 250 | 110 | 78 | 53 | 40 | 33 | 27 | 22 | 17 | 13 | 7.4 | 4.5 | 3.0 |
| March | 70 | 41 | 34 | 26 | 21 | 18 | 15 | 12.5 | 10.5 | 9.0 | 7.6 | 6.9 | 6.0 |
| April | 55 | 20 | 15 | 12 | 10.5 | 8.6 | 6.6 | 5.0 | 3.9 | 3.2 | 2.7 | 2.4 | 2.0 |
| May | 30 | 21 | 13 | 5.8 | 3.7 | 2.7 | 2.0 | 1.6 | 1.3 | 1.0 | 0.8 | 0.7 | 0.6 |
| June | 8.5 | 5.0 | 3.7 | 1.2 | 1.0 | 0.9 | 0.8 | 0.8 | 0.8 | 0.7 | 0.6 | 0.5 | 0.4 |
| July | 1.1 | 1.0 | 0.9 | 0.8 | 0.8 | 0.7 | 0.7 | 0.6 | 0.6 | 0.5 | 0.3 | 0.2 | 0.2 |
| August | 0.8 | 0.7 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 |
| September | 0.9 | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.1 | 0.1 | 0 |
| Period | 94 | 53 | 36 | 21 | 13 | 8.0 | 3.0 | 1.0 | 0.7 | 0.5 | 0.4 | 0.3 | 0.2 |

Table 31. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1946-60 GOLD CREEK NEAR BREMERTON.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 535 | 1,350 | 1,120 | 1,800 | 1,410 | 1,180 | 582 | 472 | 184 | 92 | 63 | 70 |
| Minimum | 31 | 56 | 586 | 236 | 408 | 318 | 152 | 86 | 47 | 34 | 26 | 23 |
| Average | 162 | 562 | 734 | 845 | 758 | 535 | 351 | 184 | 78 | 59 | 41 | 43 |

Table 32. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1946-60 GOLD CREEK NEAR BREMERTON.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 22 | 10.2 | 6.3 | 3.1 | 2.0 | 1.5 | 1.2 | 1.0 | 0.8 | 0.7 | 0.5 | 0.4 | 0.4 |
| November | 74 | 30 | 21 | 13.5 | 9.3 | 6.8 | 5.2 | 4.0 | 3.1 | 2.1 | 1.2 | 1.0 | 0.7 |
| December | 47 | 29 | 23 | 17.0 | 13.5 | 11.3 | 9.5 | 8.0 | 6.6 | 5.4 | 4.1 | 3.4 | 2.5 |
| January | 68 | 39 | 29 | 20 | 14.5 | 11.3 | 8.8 | 7.2 | 5.9 | 4.8 | 3.8 | 3.1 | 2.2 |
| February | 77 | 39 | 26 | 17.5 | 14.0 | 11.5 | 9.5 | 8.0 | 6.7 | 5.4 | 4.2 | 3.4 | 2.5 |
| March | 34 | 20.5 | 16.0 | 12.3 | 9.8 | 7.8 | 6.5 | 5.5 | 4.9 | 4.3 | 3.8 | 3.4 | 2.8 |
| April | 24 | 13.0 | 10.2 | 7.5 | 6.2 | 5.4 | 4.7 | 4.1 | 3.6 | 3.0 | 2.6 | 2.3 | 1.9 |
| May | 12.5 | 6.1 | 4.6 | 3.5 | 3.0 | 2.7 | 2.4 | 2.2 | 2.0 | 1.8 | 1.5 | 1.3 | 1.1 |
| June | 4.6 | 3.0 | 2.5 | 2.0 | 1.8 | 1.6 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.8 | 0.6 |
| July | 2.2 | 1.7 | 1.5 | 1.2 | 1.1 | 1.0 | 0.9 | 0.8 | 0.8 | 0.7 | 0.6 | 0.6 | 0.5 |
| August | 1.5 | 1.1 | 1.0 | 0.9 | 0.8 | 0.8 | 0.7 | 0.6 | 0.6 | 0.5 | 0.5 | 0.4 | 0.4 |
| September | 2.2 | 1.3 | 1.1 | 0.9 | 0.8 | 0.7 | 0.6 | 0.6 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 |
| Period | 45 | 21.5 | 15 | 9.1 | 6.2 | 4.3 | 3.0 | 1.9 | 1.2 | 0.9 | 0.6 | 0.5 | 0.4 |

Table 33. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1945-56 TAHUYA RIVER NEAR BREMERTON.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 1,660 | 5,000 | 5,010 | 7,380 | 6,460 | 4,110 | 1,890 | 1,960 | 467 | 144 | 110 | 156 |
| Minimum | 11 | 25 | 1,790 | 1,160 | 1,290 | 977 | 412 | 171 | 68 | 27 | 19 | 12 |
| Average | 496 | 2,390 | 2,966 | 3,376 | 3,132 | 1,911 | 994 | 492 | 208 | 103 | 51 | 55 |

Table 34. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1946-56 TAHUYA RIVER NEAR BREMERTON.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 90 | 44 | 23 | 10 | 5.0 | 2.7 | 1.9 | 1.5 | 1.1 | 0.6 | 0.2 | 0.1 | 0.1 |
| November | 260 | 155 | 110 | 70 | 46 | 32 | 22 | 14.5 | 8.5 | 4.1 | 1.3 | 0.5 | 0.2 |
| December | 180 | 125 | 98 | 73 | 58 | 47 | 39 | 32 | 26 | 20 | 14 | 10 | 4.5 |
| January | 300 | 180 | 130 | 86 | 62 | 45 | 33 | 26 | 21 | 16.5 | 13 | 11 | 8.5 |
| February | 280 | 180 | 130 | 78 | 57 | 45 | 37 | 29 | 22 | 16 | 11.5 | 9.5 | 7.0 |
| March | 140 | 85 | 65 | 46 | 36 | 29 | 23 | 18 | 15 | 12 | 9.8 | 8.5 | 7.0 |
| April | 72 | 38 | 32 | 24 | 19 | 15.5 | 13 | 11 | 9.5 | 8.0 | 6.5 | 5.4 | 3.5 |
| May | 54 | 28 | 14 | 8.4 | 6.7 | 6.0 | 5.4 | 4.9 | 4.4 | 3.8 | 3.0 | 2.5 | 1.8 |
| June | 13 | 7.8 | 6.0 | 4.5 | 3.7 | 3.2 | 2.8 | 2.5 | 2.1 | 1.8 | 1.4 | 1.1 | 0.7 |
| July | 6.0 | 3.9 | 3.1 | 2.5 | 2.1 | 1.8 | 1.5 | 1.2 | 1.0 | 0.7 | 0.5 | 0.4 | 0.2 |
| August | 2.3 | 1.7 | 1.5 | 1.3 | 1.2 | 1.0 | 0.8 | 0.6 | 0.5 | 0.4 | 0.3 | 0.3 | 0.2 |
| September | 5.5 | 3.1 | 2.0 | 1.2 | 0.9 | 0.8 | 0.6 | 0.5 | 0.4 | 0.3 | 0.2 | 0.2 | 0.2 |
| Period | 180 | 92 | 62 | 36 | 23 | 14 | 7.7 | 4.0 | 2.2 | 1.1 | 0.6 | 0.4 | 0.2 |

Table 35. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1945-53 PANTHER CREEK NEAR BREMERTON.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 220 | 423 | 724 | 1,200 | 650 | 565 | 244 | 284 | 54 | 17 | 4.4 | 0.4 |
| Minimum | 0 | 0 | 163 | 219 | 303 | 149 | 44 | 11 | 0 | 0 | 0 | 0 |
| Average | 36.51 | 207 | 442 | 531 | 500 | 259 | 109 | 70 | 11.6 | 3.03 | 0.488 | 0.04 |

Table 36. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1946-53 PANTHER CREEK NEAR BREMERTON.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 11 | 3.7 | 1.4 | 0.2 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| November | 20 | 15 | 11.5 | 6.8 | 3.7 | 2.1 | 1.1 | 0.6 | 0.3 | 0.1 | 0 | 0 | 0 |
| December | 23 | 18 | 15 | 12 | 9.7 | 7.9 | 6.2 | 4.7 | 3.5 | 2.4 | 1.4 | 0.9 | 0.1 |
| January | 29 | 23 | 20 | 15.5 | 12 | 8.5 | 6.0 | 4.8 | 4.2 | 3.2 | 1.5 | 0.7 | 0.5 |
| February | 50 | 25 | 19 | 13.5 | 10.5 | 8.4 | 6.7 | 5.4 | 4.3 | 3.2 | 2.2 | 1.5 | 1.0 |
| March | 15.5 | 11 | 8.8 | 6.4 | 5.0 | 3.8 | 3.1 | | 2.3 | 1.9 | 1.6 | 1.4 | 1.2 |
| April | 19 | 4.4 | 3.2 | 2.5 | 2.1 | 1.7 | 1.3 | 1.1 | 0.9 | 0.7 | 0.5 | 0.4 | 0.3 |
| May | 8 | 5.5 | 3.8 | 1.5 | 0.9 | 0.6 | 0.5 | 0.4 | 0.3 | 0.2 | 0.2 | 0.1 | 0 |
| June | 2.1 | 1.0 | 0.5 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0 | 0 | 0 | 0 |
| July | 0.9 | 0.3 | 0.2 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| August | 0.1 | 0.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| September | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Period | 23 | 14 | 9.6 | 5.1 | 2.9 | 1.6 | 0.6 | 0.2 | 0.1 | 0 | 0 | 0 | 0 |

Table 37. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1945-56 TAHUYA RIVER NEAR BELFAIR.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 3,890 | 12,040 | 11,120 | 18,870 | 11,960 | 9,390 | 4,280 | 4,810 | 790 | 256 | 34 | 105 |
| Minimum | 0 | 0 | 4,310 | 2,410 | 2,540 | 2,190 | 715 | 329 | 51 | 4.8 | 0 | 0 |
| Average | 872.8 | 5,097 | 6,803 | 8,654 | 6,796 | 4,176 | 2,104 | 954 | 261 | 81.48 | 18.4 | 15.48 |

Table 38. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1946-56 TAHUYA RIVER NEAR BELFAIR.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 190 | 98 | 48 | 9.0 | 4.7 | 1.7 | 0.4 | 0.3 | 0.2 | 0.1 | 0 | 0 | 0 |
| November | 660 | 270 | 210 | 145 | 100 | 68 | 44 | 29 | 16 | 3.0 | 0.1 | 0 | 0 |
| December | 400 | 250 | 220 | 170 | 130 | 110 | 90 | 74 | 58 | 42 | 29 | 20 | 5.0 |
| January | 580 | 410 | 300 | 210 | 150 | 110 | 80 | 61 | 50 | 39 | 27 | 20 | 16 |
| February | 560 | 380 | 280 | 170 | 130 | 100 | 80 | 60 | 47 | 35 | 25 | 19 | 13.5 |
| March | 310 | 170 | 130 | 97 | 75 | 60 | 50 | 40 | 32 | 27 | 22 | 19.5 | 16 |
| April | 200 | 95 | 70 | 50 | 40 | 30 | 25 | 20 | 16.5 | 14 | 11 | 9.2 | 7.0 |
| May | 140 | 52 | 26 | 16 | 12 | 10 | 8.2 | 7.0 | 6.0 | 5.2 | 4.0 | 3.2 | 2.4 |
| June | 23 | 13.5 | 9.5 | 5.4 | 4.0 | 3.2 | 2.7 | 2.3 | 1.9 | 1.5 | 1.1 | 0.8 | 0.3 |
| July | 8.0 | 4.0 | 3.0 | 2.0 | 1.6 | 1.2 | 0.9 | 0.8 | 0.6 | 0.4 | 0.3 | 0.2 | 0.1 |
| August | 1.1 | 0.8 | 0.7 | 0.5 | 0.5 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.1 | 0 | 0 |
| September | 5.5 | 0.8 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0 | 0 | 0 |
| Period | 400 | 210 | 140 | 80 | 45 | 25 | 13 | 4.5 | 1.5 | 0.4 | 0.2 | 0.1 | 0 |

Table 39. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1947-54, 1958-60, DEWATTO CREEK NEAR DEWATTO.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 5,050 | 7,940 | 11,540 | 18,170 | 14,600 | 10,140 | 6,020 | 5,170 | 1,980 | 1,300 | 1,130 | 1,320 |
| Minimum | 752 | 939 | 5,840 | 3,610 | 5,240 | 3,700 | 2,330 | 1,800 | 1,240 | 946 | 794 | 710 |
| Average | 2,043 | 5,288 | 7,722 | 9,872 | 9,431 | 5,362 | 3,677 | 2,604 | 1,540 | 1,080 | 941 | 924 |

Table 40. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1948-54, 1959-60, DEWATTO CREEK NEAR DEWATTO.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 240 | 105 | 67 | 35 | 26 | 22.5 | 20 | 19 | 18 | 17 | 16 | 15.3 | 14.5 |
| November | 600 | 280 | 200 | 130 | 90 | 66 | 50 | 37 | 28 | 21 | 16.5 | 14.8 | 13.2 |
| December | 430 | 310 | 250 | 185 | 150 | 120 | 100 | 85 | 70 | 55 | 40 | 31 | 22 |
| January | 750 | 450 | 350 | 250 | 190 | 140 | 105 | 83 | 68 | 55 | 45 | 41 | 36 |
| February | 1,000 | 500 | 360 | 240 | 180 | 140 | 115 | 95 | 78 | 64 | 50 | 41 | 32 |
| March | 290 | 200 | 160 | 115 | 90 | 77 | 69 | 62 | 58 | 53 | 48 | 44 | 39 |
| April | 230 | 120 | 94 | 75 | 63 | 56 | 51 | 47 | 43 | 40 | 37 | 35 | 33 |
| May | 140 | 88 | 65 | 50 | 42 | 38 | 35 | 33 | 31 | 29 | 27 | 25 | 23 |
| June | 45 | 35 | 31 | 28 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 |
| July | 28 | 23.5 | 21.5 | 20 | 19 | 18.2 | 17.6 | 17.1 | 16.7 | 16.2 | 15.8 | 15.2 | 15 |
| August | 22.5 | 20 | 18.8 | 17.4 | 16.5 | 16 | 15.4 | 15 | 14.4 | 14 | 13.2 | 12.7 | 12 |
| September | 41 | 27 | 22.5 | 18.5 | 17 | 15.5 | 14.5 | 14 | 13 | 12.5 | 12 | 11.6 | 11.2 |
| Period | 500 | 240 | 160 | 95 | 68 | 50 | 36 | 26 | 21 | 17 | 14.5 | 13.5 | 12 |

Table 41. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1947-60 DOGFISH CREEK NEAR POULSBO.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 493 | 1,000 | 1,850 | 1,950 | 2,320 | 1,100 | 687 | 629 | 420 | 269 | 299 | 307 |
| Minimum | 249 | 362 | 527 | 425 | 429 | 424 | 319 | 235 | 203 | 153 | 154 | 178 |
| Average | 378 | 600 | 842 | 1,094 | 1,067 | 714 | 481 | 361 | 272 | 210 | 211 | 240 |

Table 42. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1948-60 DOGFISH CREEK NEAR POULSBO.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 22 | 12 | 9.5 | 7.2 | 6.1 | 5.5 | 5.2 | 4.9 | 4.7 | 4.4 | 4.0 | 3.5 | 2.8 |
| November | 47 | 28 | 17 | 12 | 9.5 | 8.1 | 7.2 | 6.5 | 5.9 | 5.4 | 4.7 | 4.3 | 3.8 |
| December | 58 | 33 | 24 | 17 | 14 | 12 | 9.8 | 8.6 | 7.8 | 6.8 | 6.0 | 5.5 | 4.8 |
| January | 110 | 50 | 35 | 24 | 19 | 15 | 11.5 | 9.0 | 7.3 | 6.2 | 5.5 | 5.2 | 5.0 |
| February | 110 | 60 | 38 | 24 | 17 | 14 | 11.5 | 9.8 | 8.4 | 7.5 | 6.6 | 6.2 | 5.8 |
| March | 40 | 25 | 19 | 15 | 12 | 10 | 9.3 | 8.3 | 7.6 | 6.9 | 6.2 | 5.9 | 5.6 |
| April | 20 | 15 | 12 | 9.7 | 8.5 | 7.6 | 7.0 | 6.5 | 6.0 | 5.6 | 5.2 | 5.0 | 4.7 |
| May | 18 | 10.5 | 8.0 | 6.3 | 5.6 | 5.3 | 5.2 | 5.0 | 4.7 | 4.3 | 4.0 | 3.8 | 3.5 |
| June | 10.5 | 7.2 | 6.1 | 5.3 | 4.7 | 4.4 | 4.2 | 4.0 | 3.8 | 3.6 | 3.4 | 3.2 | 2.9 |
| July | 6.0 | 4.9 | 4.5 | 4.0 | 3.8 | 3.6 | 3.4 | 3.2 | 3.0 | 2.9 | 2.6 | 2.5 | 2.0 |
| August | 6.0 | 4.9 | 4.5 | 4.0 | 3.8 | 3.6 | 3.4 | 3.3 | 3.1 | 3.0 | 2.8 | 2.7 | 2.5 |
| September | 10.5 | 6.3 | 5.2 | 4.6 | 4.3 | 4.0 | 3.8 | 3.7 | 3.5 | 3.3 | 3.1 | 2.9 | 2.6 |
| Period | 52 | 24 | 16 | 11 | 8.3 | 6.8 | 5.8 | 5.1 | 4.4 | 3.8 | 3.3 | 2.9 | 2.4 |

Table 43. MAXIMUM, MINIMUM, AND AVERAGE OF THE MONTHLY DISCHARGES, IN ACRE-FEET, FOR THE PERIOD 1947-60 HUGE CREEK NEAR WAUNA.

| | October | November | December | January | February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum | 548 | 1,370 | 2,370 | 2,810 | 2,870 | 2,390 | 982 | 761 | 491 | 371 | 347 | 351 |
| Minimum | 252 | 246 | 306 | 632 | 718 | 549 | 367 | 294 | 273 | 263 | 258 | 250 |
| Average | 360 | 631 | 1,147 | 1,593 | 1,390 | 1,027 | 656 | 485 | 364 | 313 | 289 | 287 |

Table 44. DISCHARGE, IN CUBIC FEET PER SECOND, EQUALED OR EXCEEDED FOR SPECIFIED PERCENT OF TIME--1948-60 HUGE CREEK NEAR WAUNA.

| | Percent of time | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 99 |
| October | 16.9 | 10.1 | 8.3 | 6.8 | 6.0 | 5.6 | 5.2 | 4.9 | 4.7 | 4.4 | 4.2 | 4.0 | 3.8 |
| November | 56 | 33 | 20.5 | 12.5 | 9.8 | 8.3 | 7.2 | 6.5 | 5.8 | 5.2 | 4.7 | 4.3 | 3.9 |
| December | 88 | 48 | 36 | 25.5 | 20 | 16.5 | 13.5 | 11 | 9.1 | 7.2 | 5.7 | 4.9 | 4.1 |
| January | 128 | 77 | 58 | 40 | 30 | 22.5 | 17 | 13 | 11 | 9.2 | 7.6 | 6.9 | 6.1 |
| February | 115 | 65 | 50 | 35 | 27 | 22 | 18 | 15 | 12.5 | 10.5 | 8.6 | 7.5 | 5.9 |
| March | 66 | 42 | 33 | 23 | 17.5 | 14 | 12 | 10.8 | 10 | 9.3 | 8.6 | 8.2 | 7.6 |
| April | 29 | 18 | 15.3 | 13 | 11.7 | 10.7 | 9.9 | 9.2 | 8.4 | 7.8 | 7.0 | 6.4 | 5.6 |
| May | 20 | 12 | 10.6 | 9.2 | 8.4 | 7.7 | 7.2 | 6.7 | 6.3 | 5.8 | 5.4 | 5.0 | 4.8 |
| June | 10.5 | 8.3 | 7.5 | 6.8 | 6.4 | 6.0 | 5.8 | 5.5 | 5.3 | 5.0 | 4.8 | 4.6 | 4.3 |
| July | 7.2 | 6.4 | 6.0 | 5.7 | 5.4 | 5.2 | 5.1 | 4.9 | 4.7 | 4.5 | 4.3 | 4.2 | 4.0 |
| August | 6.4 | 5.7 | 5.4 | 5.2 | 5.0 | 4.8 | 4.7 | 4.6 | 4.5 | 4.4 | 4.2 | 4.1 | 3.9 |
| September | 8.0 | 6.3 | 5.8 | 5.3 | 5.0 | 4.8 | 4.6 | 4.5 | 4.4 | 4.2 | 4.1 | 4.0 | 3.8 |
| Period | 70 | 37 | 25 | 14.5 | 10.6 | 8.5 | 7.2 | 6.2 | 5.5 | 4.9 | 4.5 | 4.3 | 4.0 |

Table 45. SYNTHETIC ANNUAL RUNOFF RATIOS BY WATER YEARS FOR GRAPEVIEW AND VARIOUS RELATED STATISTICS.

| Year | Ratio | Year | Ratio | Year | Ratio | Year | Ratio | Year | Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 1908 | 1.16 | 1919 | 1.29 | 1930 | 0.63 | 1941 | 0.76 | 1952 | 0.82 |
| 1909 | 1.05 | 1920 | 0.89 | 1931 | 0.81 | 1942 | 0.67 | 1953 | 1.00 |
| 1910 | 1.37 | 1921 | 1.18 | 1932 | 1.18 | 1943 | 0.88 | 1954 | 1.10 |
| 1911 | 1.12 | 1922 | 0.97 | 1933 | 1.31 | 1944 | 0.64 | 1955 | 0.90 |
| 1912 | 0.85 | 1923 | 0.94 | 1934 | 1.36 | 1945 | 0.81 | 1956 | 1.33 |
| 1913 | 0.94 | 1924 | 0.84 | 1935 | 1.39 | 1946 | 1.10 | 1957 | 0.96 |
| 1914 | 1.02 | 1925 | 1.03 | 1936 | 0.95 | 1947 | 0.88 | 1958 | 0.90 |
| 1915 | 0.87 | 1926 | 0.78 | 1937 | 0.88 | 1948 | 1.04 | 1959 | 1.06 |
| 1916 | 1.31 | 1927 | 1.04 | 1938 | 1.17 | 1949 | 0.95 | 1960 | 1.17 |
| 1917 | 0.90 | 1928 | 1.04 | 1939 | 0.84 | 1950 | 1.29 | | |
| 1918 | 1.07 | 1929 | 0.71 | 1940 | 0.99 | 1951 | 1.33 | | |

| Period | Sum of ratios $\Sigma X$ | Mean $\bar{X}$ | Standard deviation from the mean S | Three standard deviations from the mean 3S | Probable error PE | Coefficient of variation in % CV |
|---|---|---|---|---|---|---|
| 1908-33 | 26.30 | 1.012 | 0.193 | 0.578 | 0.130 | 19.03 |
| 1934-59 | 26.00 | 1.000 | 0.210 | 0.629 | 0.141 | 20.96 |
| 1908-59 | 52.30 | 1.006 | 0.199 | 0.598 | 0.134 | 19.82 |
| 1908-60 | 53.47 | 1.009 | 0.199 | 0.596 | 0.134 | 19.69 |
| 1946-60 | 15.83 | 1.055 | 0.165 | 0.495 | 0.111 | 15.64 |

## ANNUAL RUNOFF RATIOS

Records from the major stream-gaging stations within the report area were found to correlate poorly with corresponding records of other nearby long-term gaging stations. Outside runoff records consequently could not be used as valid indicators of streamflow conditions within the study area. Generally the next best indicator of runoff is precipitation and records at Grapeview were found to correlate well with most streams on the Kitsap Peninsula. The Grapeview precipitation record was therefore used to develop a synthetic indicator of annual water-year runoff.

Grapeview's annual water-year precipitation was determined for the years 1908-60. Estimates of water-year evapotranspiration were then made by the Thornthwaite procedure (see p. 12), and these were subtracted from water-year precipitation to obtain an estimate of water-year runoff. Computed runoff values were then adjusted further for antecedent wetness conditions until optimum correlations were obtained between computed values for Grapeview and measured values for major report area stream gages. Finally the adjusted values for annual runoff at Grapeview producing the best correlations were used to compute ratios of individual water-year runoff to mean water-year runoff for the 26-year period 1934-59. These synthetic runoff ratios represent percentages of the 26-year mean and can be used to estimate runoff for years of missing record for stream gages in the report area.

All synthetic Grapeview runoff ratios, the means for the periods 1946-60, 1908-33, and 1934-59, and other statistics are listed in table 45. The statistics are useful in analyzing long-term variations of annual runoff and are discussed in the section on individual basin analysis.

Table 46 shows the various degrees of correlation between synthetic Grapeview runoff and actual measured runoff of certain report area streams. A value of +1.0 in this table means a perfect correlation; thus the trend indicates that more confidence can be placed in estimates of runoff for streams in the southern part of the study area than those made for streams in the northern part.

Table 46. CORRELATION OF SYNTHETIC GRAPEVIEW RUNOFF RATIOS WITH MEASURED RUNOFF OF VARIOUS REPORT AREA STREAMS.

| Synthetic Grapeview runoff ratios with measured runoff at -- | | | | Correlation coefficient |
|---|---|---|---|---|
| Stream | | Gage | Period | |
| Union River near Bremerton | - | 0630 | 1946-59 | + 0.91 |
| Union River near Belfair | - | 0635 | 1948-59 | + 0.88 |
| Mission Creek near Bremerton | - | 0645 | 1946-53 | + 0.92 |
| Mission Creek near Belfair | - | 0650 | 1946-52 | + 0.94 |
| Gold Creek near Bremerton | - | 0655 | 1946-60 | + 0.90 |
| Tahuya River near Bremerton | - | 0660 | 1946-56 | + 0.93 |
| Panther Creek near Bremerton | - | 0670 | 1946-53 | + 0.96 |
| Tahuya River near Belfair | - | 0675 | 1946-56 | + 0.92 |
| Dewatto Creek near Dewatto | - | 0685 | 1948-54, 1959-60 | + 0.90 |
| Dogfish Creek near Poulsbo | - | 0700 | 1948-60 | + 0.51 |
| Huge Creek near Wauna | - | 0735 | 1948-60 | + 0.95 |

Though not as representative of long-term trends, runoff studies based on the shorter 1946-60 period are probably more sound because less estimated data are involved. The following surface-water analyses were, therefore, presented in terms of values and statistics evaluated for this period unless otherwise indicated.

If the runoff ratios are valid, mean annual water-year runoff for the 1946-60 period should be about 5.5 percent higher than that during the years 1934-59. This relationship can be used to adjust short-term 15-year figures to be representative of the longer period. To have a standard basis for comparison, continuous records of a year or more were adjusted by means of these runoff ratios to the 1946-60 and 1934-59 periods and are listed in table 47.

## EFFECTIVE PRECIPITATION AND RUNOFF MAP

The isohyetals shown on plate 4 adequately describe the mean annual quantity and distribution of precipitation over the report area, but interwatershed ground-water transfer and the associated uncertainties involved in extrapolating measured runoff quantities to their place of origin make it difficult to depict runoff quantities on a map by the same isogram method.

A practical solution to this problem is afforded by using a hypothetical potential yield quantity called effective precipitation. This is similar to actual precipitation in that it can be clearly represented by an isogram map. The mean annual effective precipitation of an area is defined as that portion of precipitation which is effective in producing mean annual runoff. Assuming net changes in storage are negligible, effective precipitation may also be defined as the amount of water remaining in an area after mean annual evapotranspiration losses have been subtracted from mean annual precipitation. If the assumption about storage is correct, and it generally is over extended periods of time, the effective precipitation of an area will be equivalent to the amount of runoff produced by the area. This, however, does not imply that all runoff waters from a given area will necessarily drain to the sea within the same topographic drainage basin boundaries where they originated as precipitation.

In addition to mean annual precipitation, plate 4 shows mean annual effective precipitation and actual measured amounts of runoff in the report area adjusted to the period 1946-60. In all cases, actual runoff values in inches of water on the basin appear near the gage locations and the contributing drainage areas are outlined in orange.

Based on the above effective precipitation analysis, the mean annual yield from land masses within the report area was about 1,042,000 acre-feet which is equivalent to an average depth of 29.25 inches of water over all the land areas. The mean annual yield for the Kitsap Peninsula proper was found to be about 944,000 acre-feet or an equivalent of 30.41 inches of water over this area. The yield of each stream basin is discussed in the Individual Basin Analysis section.

## LOW FLOWS

In the Kitsap Peninsular area streamflow usually reaches an annual minimum during the months of August or September but occasionally the lowest flows occur as late as October or, in certain exceptional cases, as early as July.

Table 47. MEASURED MEAN ANNUAL RUNOFF IN INCHES ADJUSTED BY GRAPEVIEW RUNOFF RATIOS TO THE PERIODS 1946-60 AND 1934-59.

| Stream | Gage | Water years of record | Adjusted mean annual water year runoff 1946-60 | 1934-59 |
|---|---|---|---|---|
| Union River near Bremerton | 0630 | 1946-59 | 51.95 | 49.25 |
| Union River near Belfair | 0635 | 1948-59 | 36.32 | 34.43 |
| Mission Creek near Bremerton | 0645 | 1946-53 | 49.41 | 46.84 |
| Mission Creek near Belfair | 0650 | 1946-52 | 37.83 | 35.85 |
| Gold Creek near Bremerton | 0655 | 1946-60 | 54.27 | 51.44 |
| Tahuya River near Bremerton | 0660 | 1946-56 | 50.04 | 47.43 |
| Panther Creek near Bremerton | 0670 | 1946-53 | 41.66 | 39.49 |
| Tahuya River near Belfair | 0675 | 1946-56 | 43.42 | 41.15 |
| Dewatto Creek near Dewatto | 0685 | 1948-54, 1959-60 | 49.95 | 47.34 |
| Dogfish Creek near Poulsbo | 0700 | 1948-60 | 24.03 | 22.78 |
| Chico Creek near Bremerton | 0720 | 1948-50 | 33.07 | 31.34 |
| Blackjack Creek at Port Orchard | 0725 | 1948-50 | 23.61 | 22.38 |
| Burley Creek at Burley | 0730 | 1948-50 | 33.73 | 31.97 |
| Huge Creek near Wauna | 0735 | 1948-60 | 24.55 | 23.28 |

Continuous streamflow records provide the best data for studying this low-flow period, but miscellaneous measurements give wider, more economical coverage and as a result have been employed to furnish the bulk of information for this area. Miscellaneous low-flow measurements made by the U.S. Geological Survey of most of the larger streams have been summarized in table 11. To provide complete coverage of all streams, the Division of Water Resources in the summer of 1961 made low-flow measurements or estimates on all remaining small stream systems not previously measured by the U.S.G.S. (table 48). Spot measurements or estimates do not necessarily indicate the minimum flow to be expected, but they do provide approximations of the relative magnitudes of low flows.

Upstream diversion and consumptive use probably influence many of these low-flow figures, but existing information is inadequate to determine the extent. Since withdrawals are generally at a peak during the low-flow period, it is logical to assume that nearly all of the upstream diversions allowed by water rights for consumptive uses are reflected in each low-flow measurement.

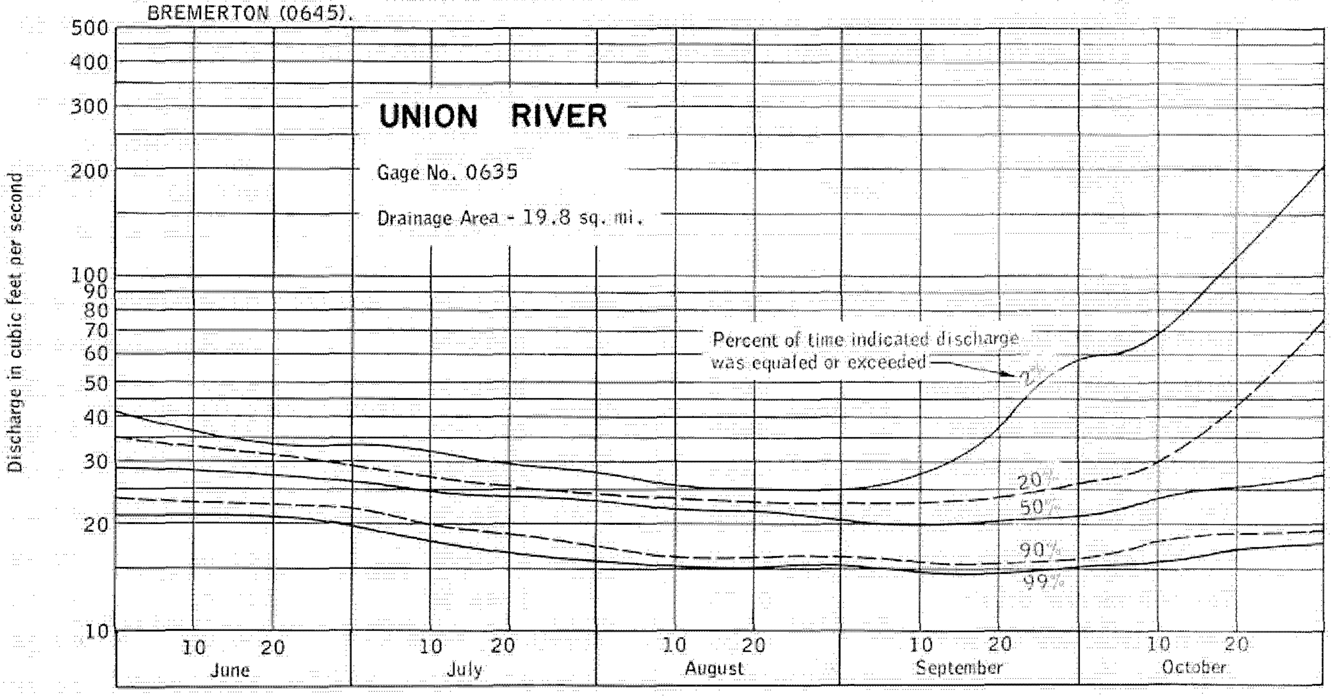
As mentioned previously, flow-duration curves (pages 70 - 91) have been developed for the streams with five or more years of continuous record. These curves provide useful information by showing the yearly or monthly duration of a given low flow over the particular period of record.

A more comprehensive picture of streamflow variations during the low-flow period is presented in figures 75-79. These figures are called discharge-duration hydrographs as basically they present flow-duration data in a chronologic sequence similar to a hydrograph. This is accomplished by determining flow-duration relationships for successive standard periods of time throughout the year and then plotting the discharges for specific durations from these relationships into a family of hydrographs. Flow-duration relationships for short standard periods, such as a day, produce the most accurate discharge-duration hydrographs, but valid flow-duration relationships for each day cannot be established unless many years of recorded data are available for each station. Though the chronologic distribution is not as precise, valid flow-duration relationships can be determined for longer standard periods of time from relatively short gaging station records. Discharge-duration hydrographs plotted from longer standard period flow-duration data also are less erratic and more characteristic of the general flow pattern.

Since gaging station records in the report area were insufficient to derive adequate flow-duration relationships for each day, all discharge-duration hydrographs presented in this report were constructed from 20-day period duration data. Though some error in distribution is introduced into each family of hydrographs by the 20-day duration data, the effect is generally insignificant, especially during the period of lowest flows, and the resultant curves always present a more conservative picture of low-flow conditions.

The time-durations of 2, 20, 50, 90 and 99 percent, used to establish the individual curves of these discharge-duration hydrographs, were arbitrarily selected to produce a

Figure 75. DISCHARGE-DURATION HYDROGRAPHS OF UNION RIVER NEAR BELFAIR (0635) AND MISSION CREEN NEAR BREMERTON (0645).



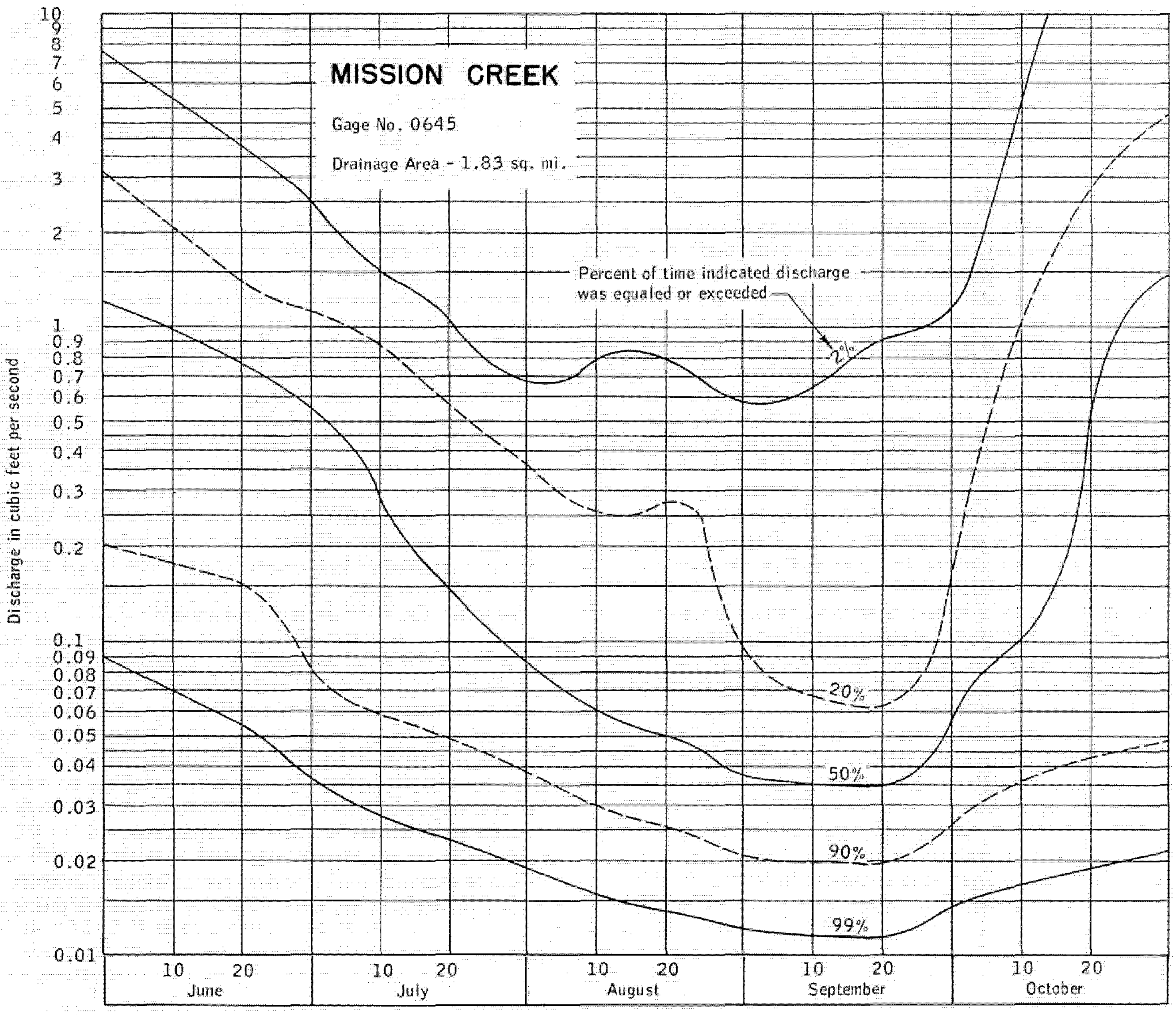
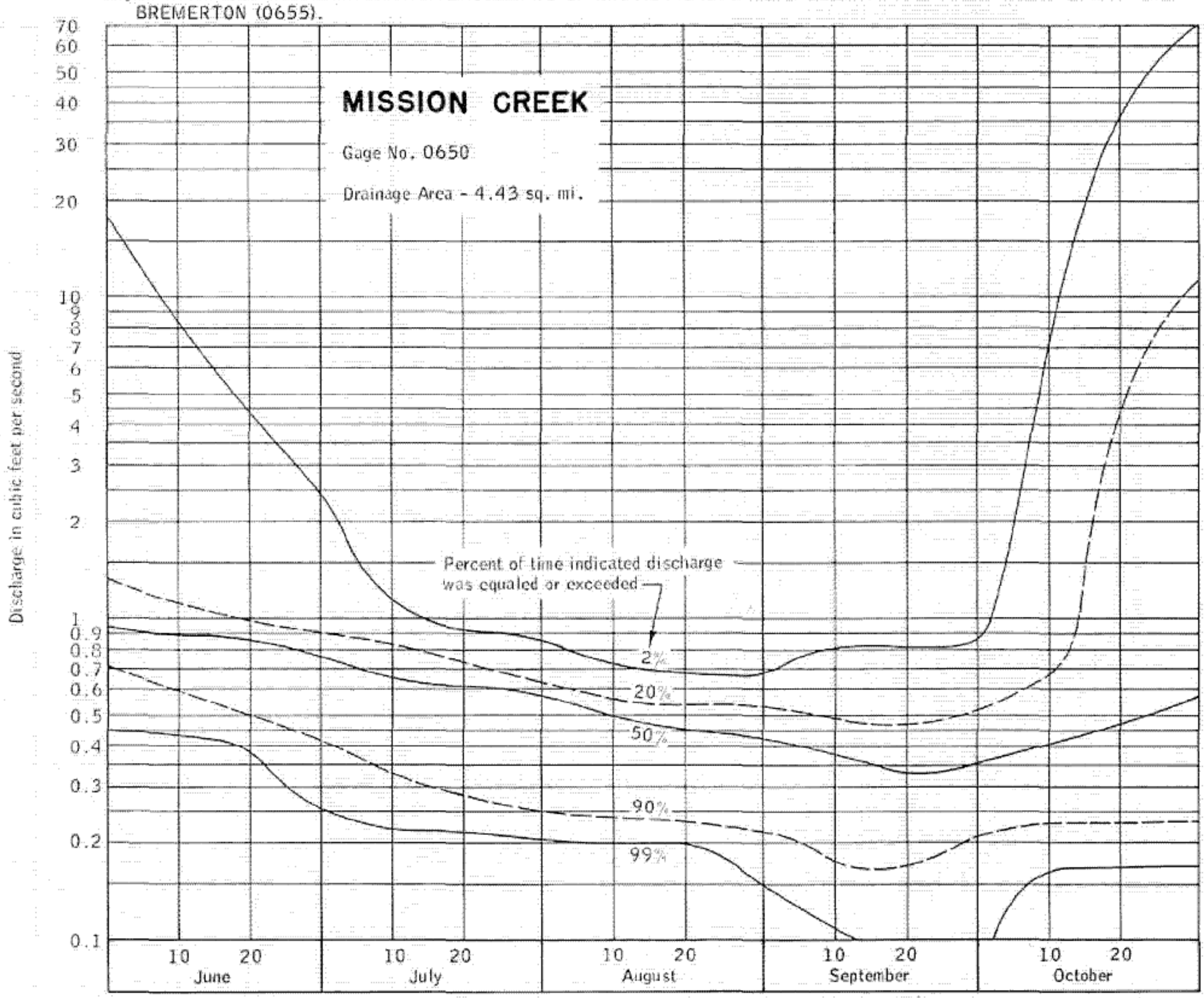



Figure 76. DISCHARGE-DURATION HYDROGRAPHS OF MISSION CREEK NEAR BELFAIR (0650) AND GOLD CREEK NEAR BREMERTON (0655).



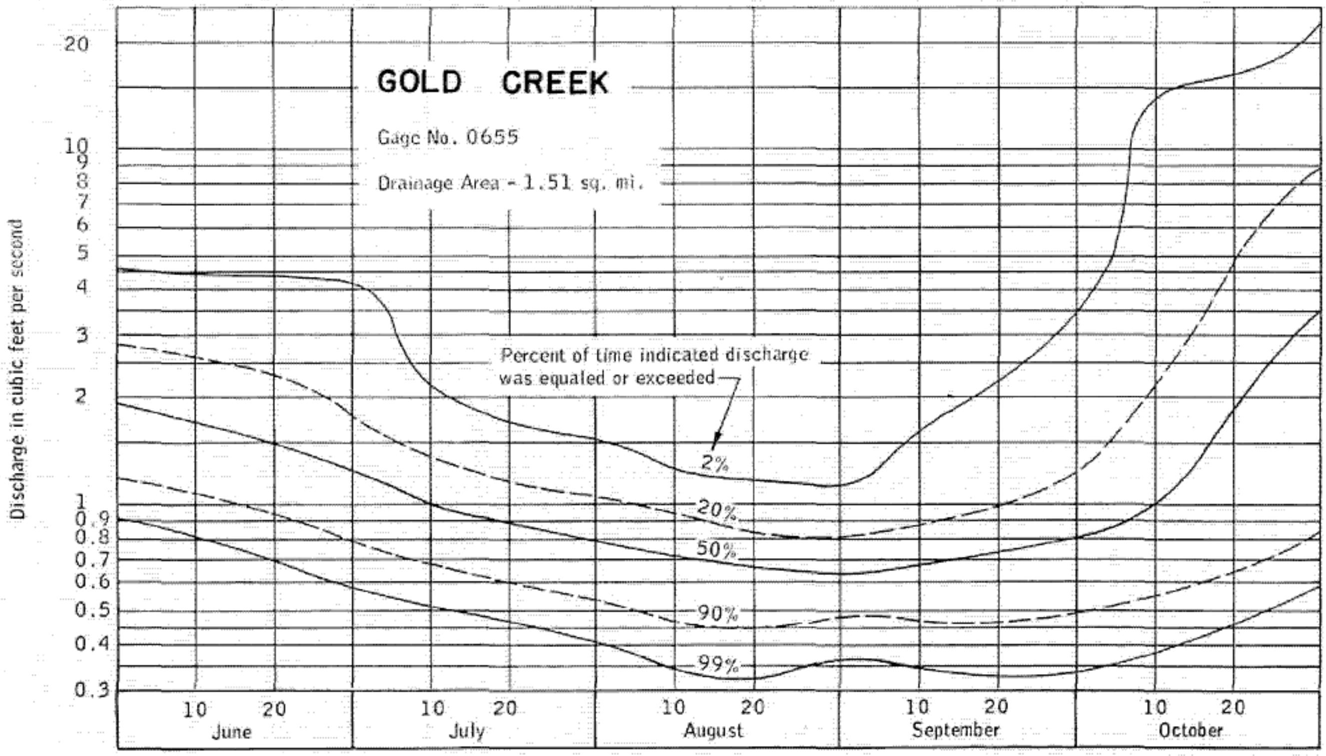
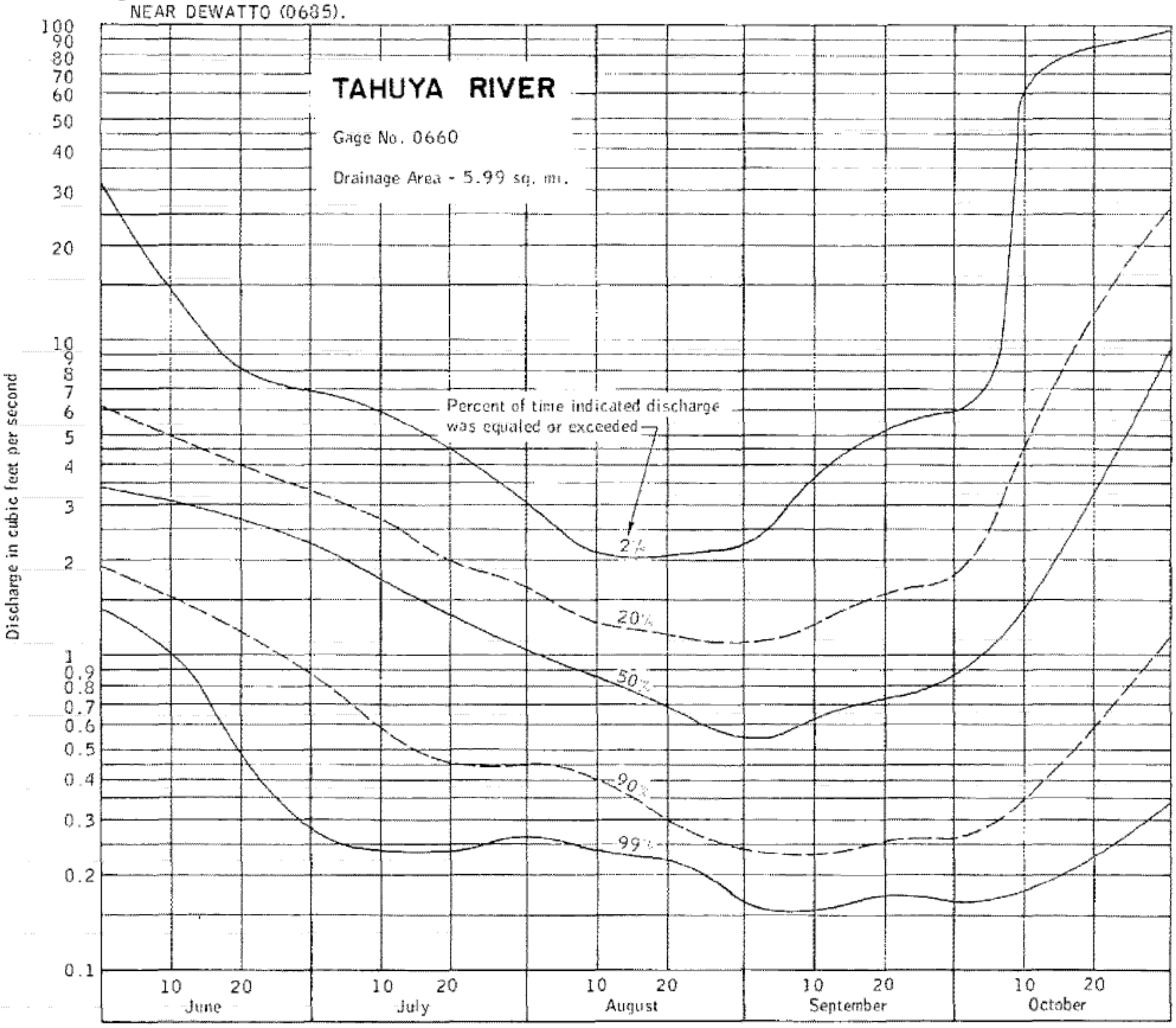



Figure 77. DISCHARGE-DURATION HYDROGRAPHS OF TAHUYA RIVER NEAR BREMERTON (0660) AND DEWATTO CREEK NEAR DEWATTO (0685).



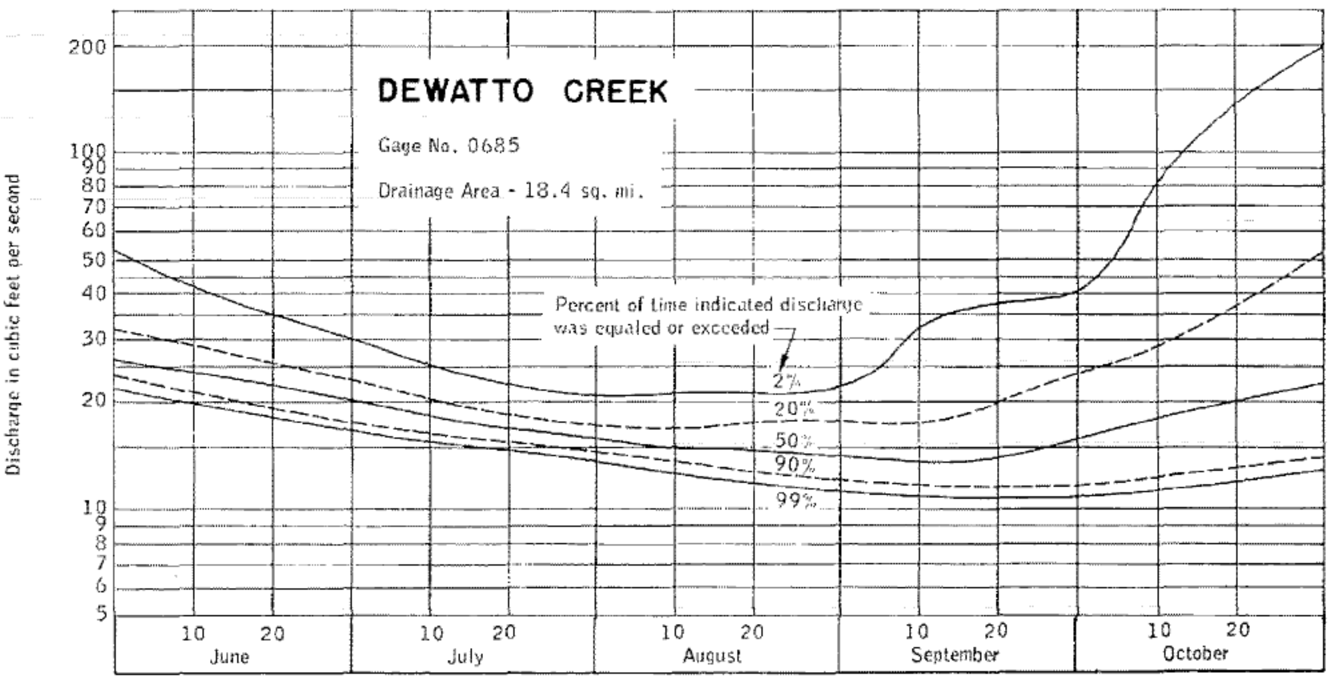



Figure 78. DISCHARGE-DURATION HYDROGRAPHS OF PANTHER CREEK NEAR BREMERTON (0670) AND DOGFISH CREEK NEAR POULSBO (0700).

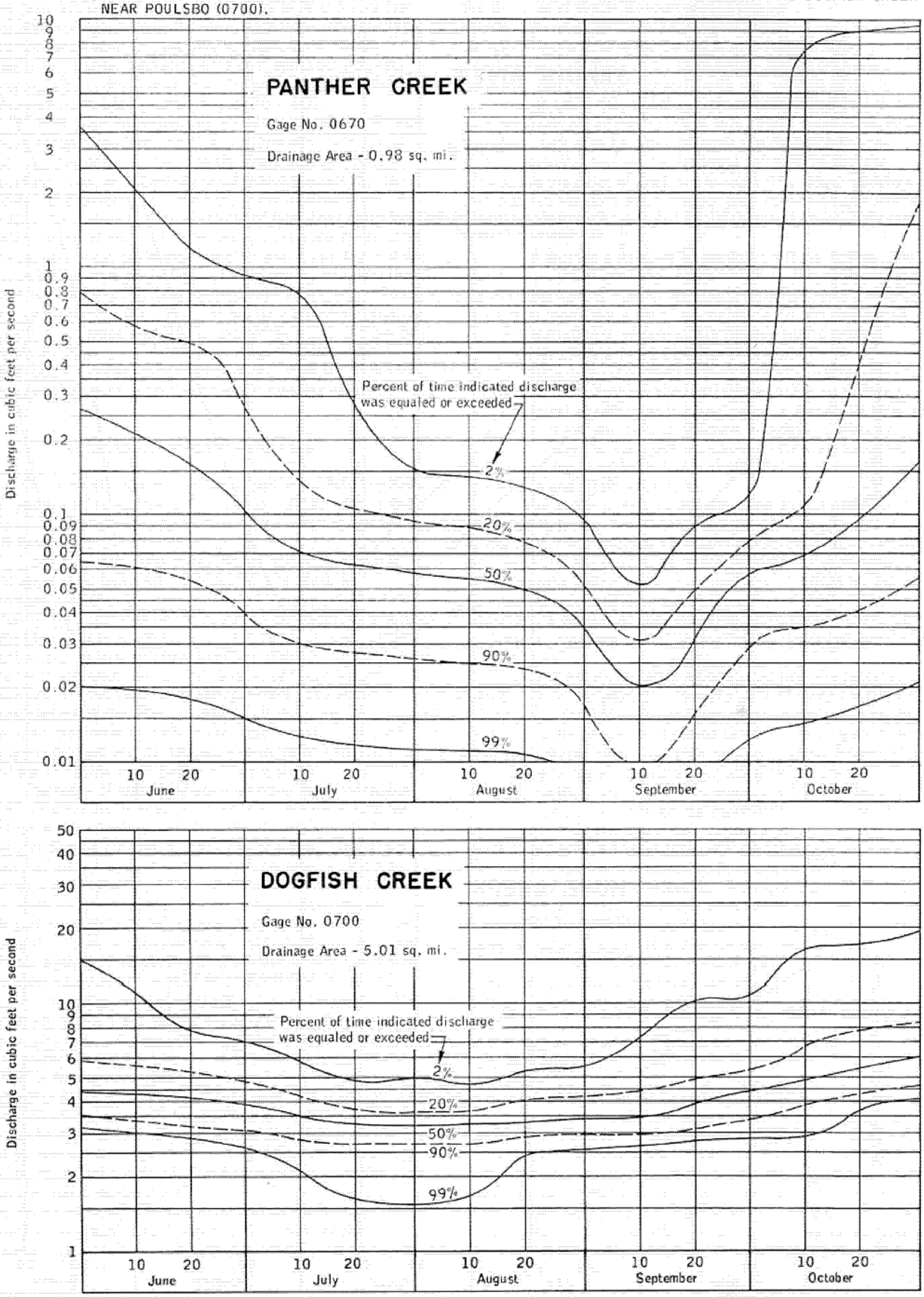
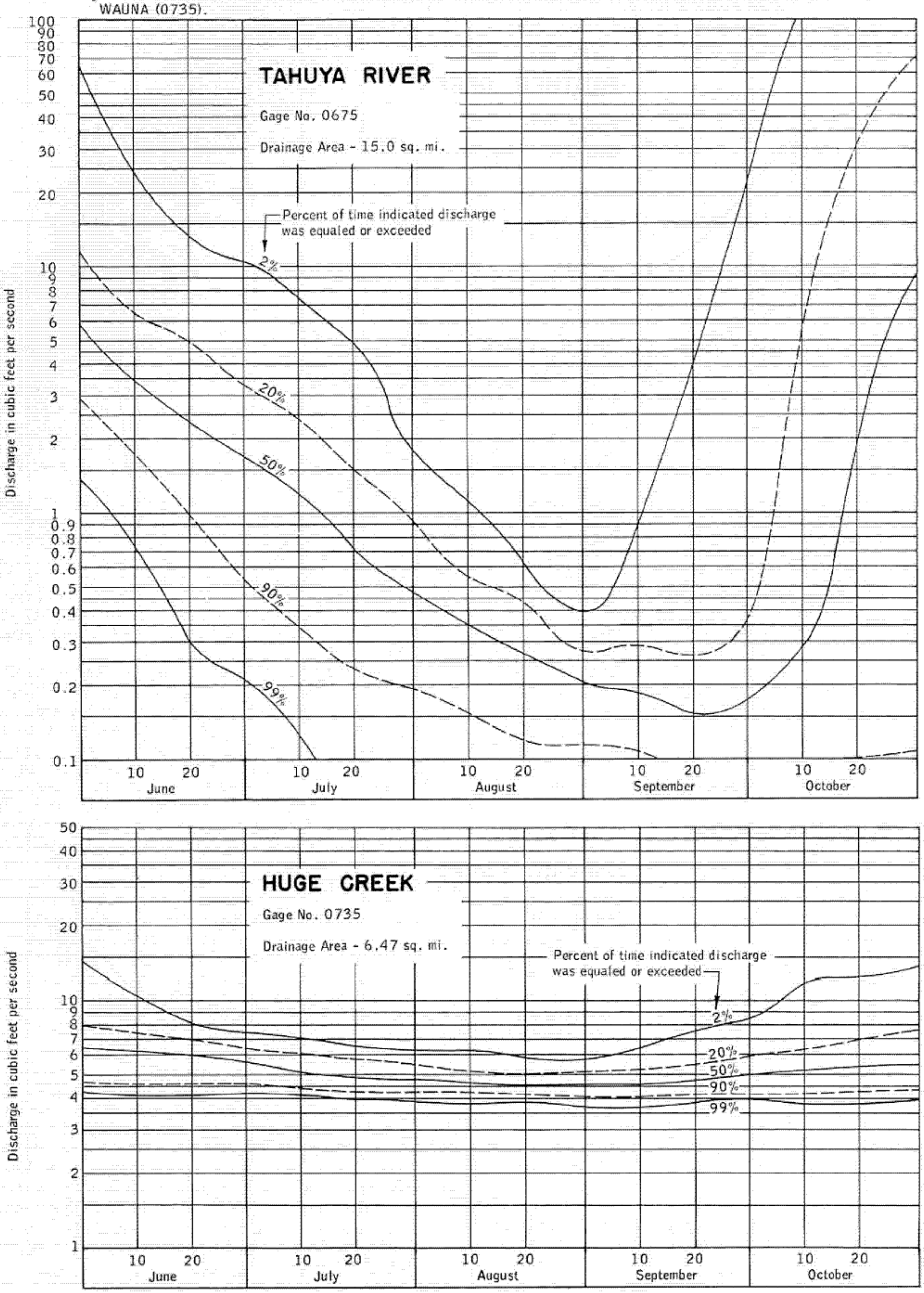


Figure 79. DISCHARGE-DURATION HYDROGRAPHS OF TAHUYA RIVER NEAR BELFAIR (0675) AND HUGE CREEK NEAR WAUNA (0735).



uniform distribution. The accuracy of very high and very low percent duration data is questionable, so curves representing durations greater than 99 percent and less than 2 percent were omitted. Extreme duration data of 0 and 100 percent, however, can be approximated from the general trend of the maximum-minimum hydrographs (pages 70 - 90).

Flow-duration percentages for each day refer to flows that have occurred on that specific day throughout the period of record. This does not necessarily imply that streamflow data obtained over an extended period would produce the same flow-duration distributions; however, if the available streamflow data offer a representative sample of long-term conditions, then each family of curves can be used to estimate the relative chance that the mean daily discharge for any given day will be greater or less than a given flow. For example, consider the date August 10 on the discharge-duration hydrograph of Gold Creek near Bremerton (fig. 76). If the data are representative, mean daily discharges equaling or exceeding 0.35 cfs can be expected for 99 percent of all future August 10ths. In the opposite sense a mean daily discharge less than 0.35 cfs has a 1 percent chance of occurring on any future August 10th.

## INDIVIDUAL BASIN ANALYSIS

The analysis and evaluation of surface-water resources in the report area is summarized in tables 47 and 48. Table 47 was described previously in the section entitled "Annual Runoff Ratios."

Each stream system shown on the surface-water map (pl. 3) appears in table 48. No analysis is given for fragmentary shoreline areas not included in any specific drainage, but runoff estimates can easily be made for these from the map showing effective precipitation and runoff (pl. 4). Independent stream systems in this table are listed consecutively according to stream number. Sub-basins of these stream systems are referred to by confluence number (see section entitled Surface-Water Map, p. 60). All drainage areas in the tabulation refer to surface drainage as established by topographic divides and do not necessarily reflect the size of ground-water basins contributing to the systems.

The areas of stream systems terminating in tidewater were based upon the available contributing drainage area above mean high water which is shown as the shoreline on U.S. Geological Survey topographic quadrangle maps. The basin boundary of such a system was easily located when the map indicated a distinct junction between the mouth of the stream and tidewater, but where no distinct division existed the divide was established at the apparent end of the tidal estuary or where the mouth of the river narrowed to 1/8 mile in width. The latter method is obviously arbitrary but is consistent with the practice of other authorities (Proudfoot, 1940, p. 33).

Estimates of mean annual effective precipitation were made for all independent stream systems with surface drainage areas greater than one square mile. Sub-basins of some of the larger systems and a few streams of special interest draining less than a square mile were also evaluated. All estimates are shown in table 48 in terms of acre-feet and depth of water over the basin in inches. These estimates are intended to indicate the apparent runoff producing potential of each basin based on surface drainage area and may differ somewhat from actual mean annual yields as they do not reflect the effects of interbasin ground-water transfer.

The last section in table 48 provides information on the low flow regimen of each stream. Included are the low flow determinations for smaller streams made by personnel of the Division of Water Resources. In the case of larger streams, reference is made to table 11 for miscellaneous low-flow discharge measurements made by the U.S. Geological Survey. The locations of these U.S. Geological Survey measurements generally don't coincide exactly with the point of analysis indicated in table 48, but they were usually close enough to be representative of conditions at that point. Some discrepancy, therefore, will also be noted between the drainage area for a U.S. Geological Survey measurement in table 11 and the area above the point of analysis in table 48. More complete and detailed information on summer flow conditions in some of the major streams is provided by discharge-duration hydrographs (figs. 75-79).

To provide a measure of annual runoff variability, the standard deviations from the mean and three statistics derived from the standard deviation are listed in table 49 for certain streams in the report area. The significance and limitations of these statistics were previously defined in the section dealing with climate (p. 11). Runoff variability in each stream is quantitatively described by the standard deviation, 3 times the standard deviation and the probable error; while the coefficient of variation is most useful in comparing relative annual runoff variabilities of different streams. Generally, a low coefficient of variation indicates a relatively constant yield from year to year while a high coefficient means the supply is variable and often unreliable.

The above statistics and the mean annual runoff were computed in inches for all streams in the report area with 5 or more years of continuous record. In each case the statistics were found for the individual period of record of each gage, and to provide a means of comparison, for identical 5, 10 and 15 year periods whenever possible. The validity of these statistics is dependent upon whether the records involved in each period are a representative sample of the entire population of all years.

Coefficients of variation computed from the runoff ratios (table 45) for the periods 1908-33, 1934-59, 1908-59, 1908-60 indicate how annual runoff variations in the report area during the recent short period (1946-60) compare with variations during other long-term periods. These figures show a slightly greater annual runoff variation during the long-term periods, so short-term statistics in table 49 should probably be increased somewhat to be representative of long-term trends. The consistently low and nearly constant value of all the coefficients indicates that little change has occurred in the runoff regimen of this area during the periods studied and the annual yield is quite dependable. A comparison between the coefficients of variation in tables 1 and 45, however, shows that annual runoff in the report area is generally a little more variable and less consistent than annual precipitation.

The last summary table (table 50) lists all known named lakes in the report area, and all unnamed lakes one acre or more in surface area (Wolcott, 1961).

### UNION RIVER

The main stem of the Union River heads in the low mountainous portion of the Western Upland approximately 5 miles west of Bremerton and just east of Gold Mountain. From there it flows in a south-southwesterly direction about 10 miles to its mouth in Lynch Cove at the head of Hood Canal near the town of Belfair. Elevations are generally higher in the western half of the basin and most of the major tributaries such as Hazel Creek (confluence No. 25), Bear Creek (confluence No. 18), and Courtney Creek (confluence No. 7) originate in this area.

Table 48. SURFACE WATER EVALUATION.

| Stream No. | Confluence No.* | Name of stream above confluence | Surface drainage area | Estimated mean annual effective precipitation from drainage area** | | Low flows‡ | Date |
|---|---|---|---|---|---|---|---|
| | | | Square miles | Inches | Acre-feet | CFS | |
| | | KITSAP PENINSULA | | | | | |
| 1 | | Unnamed Stream | 0.06 | | | 0.02 | July 31, 1961 |
| 2 | | Unnamed Stream | 0.05 | | | 0.01 | July 31, 1961 |
| 3 | | Unnamed Stream | 0.20 | | | 0.1 | July 31, 1961 |
| 4 | | Sweetwater Creek | 0.28 | | | 0.2 | July 31, 1961 |
| 5 | | Unnamed Stream | 0.03 | | | 0.01 | July 31, 1961 |
| 6 | | Unnamed Stream | 0.23 | | | 0.15 | July 31, 1961 |
| 7 | 22 | Union River | 7.34 | 49 | 19,100 | U.S.G.S. See KP 2, Table 11 | |
| | 18 | Bear Creek | 1.41 | 39 | 2,900 | U.S.G.S. See KP 3, Table 11 | |
| | | Union River | 23.4 | 39 | 49,000 | See Figure 35 and U.S.G.S. 0635, Table 10 | |
| 8 | | Unnamed Stream | 0.04 | | | 0.08 | July 31, 1961 |
| 9 | | Unnamed Stream | 0.02 | | | 0.02 | July 31, 1961 |
| 10 | | Unnamed Stream | 0.23 | | | U.S.G.S. See KP 8, Table 11 | |
| 11 | | Unnamed Stream | 0.20 | | | 0.01 | July 31, 1961 |
| 12 | 6 | Mission Creek | 1.85 | 49 | 4,900 | See Figure 39 and U.S.G.S. 0645, Table 10 | |
| | | Mission Creek | 13.6 | 37 | 26,600 | U.S.G.S. See KP 9, Table 11 | |
| 13 | | Little Mission Creek | 1.74 | 36 | 3,300 | U.S.G.S. See KP 10, Table 11 | |
| 14 | | Unnamed Stream | 0.02 | | | 0.01 | July 31, 1961 |
| 15 | | Johnson Creek | 0.66 | | | U.S.G.S. See KP 11, Table 11 | |
| 16 | | Unnamed Stream | 0.01 | | | 0.01 | July 31, 1961 |
| 17 | | Unnamed Stream | 0.02 | | | Dry | July 31, 1961 |
| 18 | | Stimson Creek | 1.86 | 37 | 3,700 | U.S.G.S. See KP 12, Table 11 | |
| 19 | | Unnamed Stream | 0.05 | | | Dry | July 31, 1961 |
| 20 | | Unnamed Stream | 0.03 | | | Dry | July 31, 1961 |
| 21 | | Unnamed Stream | 0.06 | | | 0.03 | July 31, 1961 |
| 22 | | Unnamed Stream | 0.04 | | | 0.01 | July 31, 1961 |
| 23 | | Unnamed Stream | 0.31 | | | 0.20 | July 31, 1961 |
| 24 | | Unnamed Stream | 0.06 | | | 0.01 | July 31, 1961 |
| 25 | | Unnamed Stream | 0.49 | | | U.S.G.S. See KP 13, Table 11 | |
| 26 | | Unnamed Stream | 0.02 | | | Dry | July 31, 1961 |
| 27 | | Unnamed Stream | 0.02 | | | Dry | July 31, 1961 |
| 28 | | Unnamed Stream | 0.12 | | | 0.04 | July 31, 1961 |
| 29 | | Unnamed Stream | 0.02 | | | Dry | July 31, 1961 |
| 30 | | Unnamed Stream | 0.01 | | | 0.02 | July 31, 1961 |
| 31 | | Little Shoofly Creek | 0.66 | | | U.S.G.S. See KP 14, Table 11 | |
| 32 | | Unnamed Stream | 0.04 | | | Dry | July 31, 1961 |
| 33 | | Unnamed Stream | 0.08 | | | 0.05 | July 31, 1961 |
| 34 | | Shoofly Creek | 0.88 | 41 | 1,900 | U.S.G.S. See KP 15, Table 11 | |
| 35 | | Anderson Creek | 0.06 | | | 0.05 | July 31, 1961 |
| 36 | | Unnamed Stream | 0.02 | | | 0.03 | July 31, 1961 |
| 37 | | Unnamed Stream | 0.06 | | | 0.01 | July 31, 1961 |
| 38 | | Unnamed Stream | 0.07 | | | 0.01 | July 31, 1961 |
| 39 | | Unnamed Stream | 0.10 | | | 0.02 | July 31, 1961 |
| 40 | | Unnamed Stream | 0.02 | | | 0.01 | July 31, 1961 |
| 41 | | Unnamed Stream | 0.04 | | | 0.04 | July 31, 1961 |
| 42 | | Unnamed Stream | 0.05 | | | 0.01 | July 31, 1961 |
| 43 | | Unnamed Stream | 0.02 | | | 0.01 | July 31, 1961 |
| 44 | 21 | Gold Creek | 2.55 | 53 | 7,200 | See Figure 47 and U.S.G.S. 0655, Table 10 | |
| | 20 | Tahuya River | 6.76 | 50 | 18,000 | See Figure 51 and U.S.G.S. 0660, Table 10 | |
| | 16 | Tahuya River | 17.3 | 43 | 40,000 | See Figure 59 and U.S.G.S. 0675, Table 10 | |
| | 3 | Tahuya River | 42.3 | 42 | 94,300 | U.S.G.S. See 0680, Table 10 | |
| | | Tahuya River | 45.1 | 42 | 104,400 | | |
| 45 | | Unnamed Stream | 1.64 | | | U.S.G.S. See KP 18, Table 11 | |
| 46 | | Caldervin Creek | 1.11 | 46 | 2,700 | U.S.G.S. See KP 19, Table 11 | |
| 47 | | Unnamed Stream | 0.03 | | | Dry | July 31, 1961 |
| 48 | | Unnamed Stream | 0.10 | | | 0.03 | July 31, 1961 |

* Omitted confluence numbers indicate the mouth of the stream or confluence No. 0.

** Estimates for most small streams omitted. Divide by 1.055 to obtain estimates for the 26-year period 1934-59.

‡ All flows were estimated by personnel from the State Division of Water Resources unless otherwise indicated.

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area | Estimated mean annual effective precipitation from drainage area | | Low flows | Date |
|---|---|---|---|---|---|---|---|
| | | | Square miles | Inches | Acre-feet | CFS | |
| | | | KITSAP PENINSULA | | | | |
| 49 | | Unnamed Stream | 0.02 | | | Dry | July 31, 1961 |
| 50 | | Hall Creek | 0.09 | | | 0.1 | July 31, 1961 |
| 51 | | Unnamed Stream | 0.01 | | | 0.03 | July 31, 1961 |
| 52 | | Hoddy Creek | 0.14 | | | 0.3 | July 31, 1961 |
| 53 | | Unnamed Stream | 0.03 | | | 0.03 | July 31, 1961 |
| 54 | | Fay Creek | 0.04 | | | 0.03 | July 31, 1961 |
| 55 | | Browns Creek | 0.61 | | | 0.08 | July 31, 1961 |
| 56 | | Unnamed Stream | 0.04 | | | Dry | July 31, 1961 |
| 57 | | West Creek | 0.08 | | | Dry | July 31, 1961 |
| 58 | | Nancy Creek | 0.08 | | | Dry | July 31, 1961 |
| 59 | | Unnamed Stream | 0.06 | | | Dry | July 31, 1961 |
| 60 | | Rendsland Creek | 8.74 | 47 | 21,800 | U.S.G.S. See KP 20, Table 11 | |
| 61 | | Unnamed Stream | 0.23 | | | Dry | July 31, 1961 |
| 62 | | Ralph Creek | 0.10 | | | 0.04 | July 31, 1961 |
| 63 | | Bonnie Creek | 0.03 | | | Dry | July 31, 1961 |
| 64 | | Unnamed Stream | 0.34 | | | 0.02 | July 31, 1961 |
| 65 | | Unnamed Stream | 0.13 | | | Dry | July 31, 1961 |
| 66 | | Unnamed Stream | 1.14 | 48 | 2,900 | 0.1 | July 31, 1961 |
| 67 | | Unnamed Stream | 0.34 | | | 0.02 | July 31, 1961 |
| 68 | | Unnamed Stream | 0.13 | | | 0.01 | July 31, 1961 |
| 69 | | Unnamed Stream | 0.17 | | | 0.02 | July 31, 1961 |
| 70 | | Dewatto Creek | 22.0 | 47 | 54,900 | See Figure 63 and U.S.G.S. 0685, Table 10 | |
| 71 | | Unnamed Stream | 0.04 | | | 0.03 | August 10, 1961 |
| 72 | | Unnamed Stream | 0.02 | | | 0.01 | August 10, 1961 |
| 73 | | Unnamed Stream | 0.12 | | | 0.04 | August 10, 1961 |
| 74 | | Unnamed Stream | 0.01 | | | 0.01 | August 10, 1961 |
| 75 | | Unnamed Stream | 0.06 | | | 0.01 | August 10, 1961 |
| 76 | | Unnamed Stream | 0.08 | | | 0.01 | August 10, 1961 |
| 77 | | Unnamed Stream | 0.05 | | | 0.1 | August 10, 1961 |
| 78 | | Unnamed Stream | 0.03 | | | 0.02 | August 10, 1961 |
| 79 | | Unnamed Stream | 0.05 | | | 0.03 | August 10, 1961 |
| 80 | | Unnamed Stream | 0.09 | | | 0.01 | August 10, 1961 |
| 81 | | Unnamed Stream | 0.15 | | | 0.02 | August 10, 1961 |
| 82 | | Unnamed Stream | 0.13 | | | 0.2 | August 10, 1961 |
| 83 | | Unnamed Stream | 0.07 | | | 0.01 | August 10, 1961 |
| 84 | | Unnamed Stream | 0.11 | | | 0.3 | August 10, 1961 |
| 85 | | Unnamed Stream | 0.20 | | | 0.6 | August 10, 1961 |
| 86 | | Unnamed Stream | 0.05 | | | 0.01 | August 10, 1961 |
| 87 | | Unnamed Stream | 0.47 | | | 0.04 | August 1, 1961 |
| 88 | | Unnamed Stream | 0.23 | | | 0.02 | August 1, 1961 |
| 89 | | Unnamed Stream | 0.07 | | | 0.02 | August 1, 1961 |
| 90 | | Unnamed Stream | 0.04 | | | 0.03 | August 1, 1961 |
| 91 | | Unnamed Stream | 0.17 | | | 0.06 | August 1, 1961 |
| 92 | | Unnamed Stream | 0.01 | | | 0.01 | August 2, 1961 |
| 93 | | Unnamed Stream | 0.06 | | | Dry | August 2, 1961 |
| 94 | | Unnamed Stream | 0.17 | | | 0.01 | August 2, 1961 |
| 95 | | Thomas Creek | 0.38 | | | 2.7 | August 2, 1961 |
| 96 | | Anderson Creek | 5.72 | 44 | 13,300 | U.S.G.S. See 0690, Table 10 | |
| 97 | | Unnamed Stream | 0.03 | | | 0.02 | August 2, 1961 |
| 98 | | Unnamed Stream | 0.09 | | | 0.1 | August 2, 1961 |
| 99 | | Unnamed Stream | 0.13 | | | 0.1 | August 2, 1961 |
| 100 | | Unnamed Stream | 0.11 | | | 0.05 | August 2, 1961 |
| 101 | | Harding Creek | 1.37 | 43 | 3,100 | 4.43 Measurement August 2, 1961 & U.S.G.S. See KP 25.1, Table 11 | |
| 102 | | Unnamed Stream | 0.06 | | | 0.04 | August 2, 1961 |
| 103 | | Nellita Creek | 0.38 | | | 1.0 | August 2, 1961 |
| 104 | | Unnamed Stream | 0.08 | | | Dry | August 2, 1961 |
| 105 | | Unnamed Stream | 0.01 | | | 0.01 | August 4, 1961 |
| 106 | | Unnamed Stream | 0.04 | | | 0.01 | August 4, 1961 |
| 107 | | Unnamed Stream | 0.05 | | | 0.1 | August 4, 1961 |
| 108 | | Unnamed Stream | 0.01 | | | 0.02 | August 4, 1961 |
| 109 | | Unnamed Stream | 0.02 | | | 0.03 | August 4, 1961 |
| 110 | | Unnamed Stream | 0.35 | | | 1.0 | August 4, 1961 |
| 111 | | Boyce Creek | 1.75 | 39 | 3,600 | 0.8 | August 4, 1961 |

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area | Estimated mean annual effective precipitation from drainage area | | Low flows | Date |
|---|---|---|---|---|---|---|---|
| | | | Square miles | Inches | Acre-feet | CFS | |
| | | | KITSAP PENINSULA | | | | |
| 112 | | Unnamed Stream | 0.13 | | | Dry | August 3, 1961 |
| 113 | | Stavis Creek | 5.92 | 39 | 12,300 | U.S.G.S. | See 0695, Table 10 |
| 114 | | Unnamed Stream | 0.45 | | | Dry | August 3, 1961 |
| 115 | | Unnamed Stream | 0.10 | | | Dry | August 3, 1961 |
| 116 | | Unnamed Stream | 0.04 | | | 0.07 | August 3, 1961 |
| 117 | | Seabeck Creek | 5.20 | 35 | 9,700 | U.S.G.S. | See KP 26, Table 11 |
| 118 | | Unnamed Stream | 0.02 | | | 0.01 | August 3, 1961 |
| 119 | | Unnamed Stream | 0.04 | | | 0.03 | August 3, 1961 |
| 120 | | Little Beef Creek | 0.78 | 31 | 1,300 | 0.5 | August 3, 1961 |
| 121 | | Big Beef Creek | 14.1 | 38 | 28,400 | U.S.G.S. | See KP 28, Table 11 |
| 122 | | Spring Creek | 0.07 | | | 0.50 | August 3, 1961 |
| 123 | | Johnson Creek | 0.81 | | | U.S.G.S. | See KP 29, Table 11 |
| 124 | | Anderson Creek | 4.89 | 27 | 7,100 | U.S.G.S. | See KP 30 & 31, Table 11 |
| 125 | | Unnamed Stream | 0.14 | | | 0.3 | August 7, 1961 |
| 126 | | Unnamed Stream | 0.03 | | | 0.1 | August 7, 1961 |
| 127 | | Unnamed Stream | 0.01 | | | 0.02 | August 7, 1961 |
| 128 | | Unnamed Stream | 1.27 | 25 | 1,700 | 1.5 | August 7, 1961 |
| 129 | | Unnamed Stream | 0.24 | | | 0.1 | August 8, 1961 |
| 130 | | Unnamed Stream | 0.03 | | | 0.2 | August 8, 1961 |
| 131 | | Unnamed Stream | 0.24 | | | 0.05 | August 8, 1961 |
| 132 | | Unnamed Stream | 0.03 | | | 0.02 | August 8, 1961 |
| 133 | | Unnamed Stream | 0.14 | | | 0.1 | August 8, 1961 |
| 134 | | Unnamed Stream | 2.07 | 23 | 2,500 | 4.0 | August 8, 1961 |
| 135 | | Unnamed Stream | 0.52 | | | 0.1 | August 8, 1961 |
| 136 | | Unnamed Stream | 0.02 | | | 0.1 | August 8, 1961 |
| 137 | | Unnamed Stream | 0.04 | | | 0.15 | August 8, 1961 |
| 138 | | Unnamed Stream | 0.19 | | | 0.4 | August 8, 1961 |
| 139 | | Unnamed Stream | 0.03 | | | 0.01 | August 8, 1961 |
| 140 | | Unnamed Stream | 0.94 | | | 0.03 | August 8, 1961 |
| 141 | | Unnamed Stream | 1.90 | 21 | 2,100 | 0.6 | August 8, 1961 |
| 142 | | Unnamed Stream | 0.18 | | | 0.01 | August 8, 1961 |
| 143 | | Unnamed Stream | 0.22 | | | 0.02 | August 8, 1961 |
| 144 | | Unnamed Stream | 0.92 | | | 0.01 | August 8, 1961 |
| 145 | | Unnamed Stream | 0.33 | | | 0.02 | August 8, 1961 |
| 146 | | Jump-off Creek | 1.25 | 16 | 1,200 | 0.3 | August 9, 1961 |
| 147 | | Unnamed Stream | 0.07 | | | 0.1 | August 9, 1961 |
| 148 | | Unnamed Stream | 0.67 | | | 0.2 | August 9, 1961 |
| 149 | 2 | South Unnamed Stream | 2.02 | | | U.S.G.S. | See KP 32, Table 11 |
| | 2 | East Unnamed Stream | 0.87 | | | U.S.G.S. | See KP 33, Table 11 |
| | | Unnamed Stream | 3.02 | 16 | 2,600 | 0.7 | August 9, 1961 |
| 150 | | Fern Creek | 0.44 | | | 0.04 | August 9, 1961 |
| 151 | | Unnamed Stream | 0.10 | | | 0.02 | August 9, 1961 |
| 152 | | Hudson Creek | 0.66 | | | U.S.G.S. | See KP 34, Table 11 |
| 153 | | Unnamed Stream | 0.17 | | | 0.03 | August 9, 1961 |
| 154 | | Unnamed Stream | 0.47 | | | 0.04 | August 9, 1961 |
| 155 | | Unnamed Stream | 0.38 | | | 0.01 | August 9, 1961 |
| 156 | | Unnamed Stream | 0.64 | | | 0.05 | August 9, 1961 |
| 157 | | Unnamed Stream | 0.47 | | | 0.02 | August 9, 1961 |
| 158 | | Gamble Creek | 7.29 | 14 | 5,500 | U.S.G.S. | See KP 35 and 36, Table 11 |
| 159 | | Unnamed Stream | 0.03 | | | 0.01 | August 9, 1961 |
| 160 | | Unnamed Stream | 2.79 | 11 | 1,600 | 0.1 | August 9, 1961 |
| 161 | | Unnamed Stream | 0.27 | | | 0.3 | August 9, 1961 |
| 162 | | Unnamed Stream | 0.28 | | | 0.02 | August 9, 1961 |
| 163 | | Unnamed Stream | 0.04 | | | 0.01 | August 9, 1961 |
| 164 | | Unnamed Stream | 0.84 | | | 0.15 | August 9, 1961 |
| 165 | | Unnamed Stream | 1.36 | 10 | 1,000 | Dry | August 9, 1961 |
| 166 | | Unnamed Stream | 1.01 | 9 | 500 | 0.1 | August 14, 1961 |
| 167 | | Unnamed Stream | 1.28 | 9 | 600 | 0.03 | August 14, 1961 |
| 168 | | Buck Lake Outlet | 0.34 | | | U.S.G.S. | See KP 37, Table 11 |
| 169 | | Finland Creek | 1.08 | 8 | 400 | 0.1 | August 14, 1961 |
| 170 | | Unnamed Stream | 0.66 | | | 0.05 | August 14, 1961 |
| 171 | | Unnamed Stream | 0.35 | | | 0.1 | August 14, 1961 |
| 172 | | Unnamed Stream | 0.39 | | | 0.1 | August 14, 1961 |
| 173 | | Silver Creek | 2.24 | 9 | 1,100 | U.S.G.S. | See KP 38, Table 11 |
| 174 | | Unnamed Stream | 1.28 | 9 | 600 | U.S.G.S. | See KP 39, Table 11 |
| 175 | | Unnamed Stream | 0.06 | | | 0.01 | August 14, 1961 |

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area | Estimated mean annual effective precipitation from drainage area | | Low flows | Date |
|---|---|---|---|---|---|---|---|
| | | | Square miles | Inches | Acre-feet | CFS | |
| | | | | KITSAP PENINSULA | | | |
| 176 | | Unnamed Stream | 0.08 | | | 0.04 | August 14, 1961 |
| 177 | | Unnamed Stream | 0.06 | | | 0.03 | August 14, 1961 |
| 178 | | Unnamed Stream | 0.03 | | | 0.02 | August 14, 1961 |
| 179 | | Unnamed Stream | 0.14 | | | 0.04 | August 14, 1961 |
| 180 | | Unnamed Stream | 0.30 | | | 0.05 | August 9, 1961 |
| 181 | | Carpenter Lake Outlet | 2.35 | 9 | 1,200 | U.S.G.S. See KP 40, Table 11 | |
| 182 | | Unnamed Stream | 0.60 | | | Dry | August 15, 1961 |
| 183 | | Unnamed Stream | 0.35 | | | Dry | August 15, 1961 |
| 184 | | Unnamed Stream | 0.61 | | | 0.02 | August 15, 1961 |
| 185 | | Unnamed Stream | 1.93 | 10 | 1,000 | 0.4 | August 16, 1961 |
| 186 | | Unnamed Stream | 0.17 | | | 0.01 | August 15, 1961 |
| 187 | | Unnamed Stream | 1.05 | 11 | 900 | 0.2 | August 15, 1961 |
| 188 | | Unnamed Stream | 1.00 | | | 0.1 | August 15, 1961 |
| 189 | | Unnamed Stream | 0.10 | | | 0.04 | August 15, 1961 |
| 190 | | Unnamed Stream | 0.16 | | | 0.05 | August 15, 1961 |
| 191 | | Unnamed Stream | 0.04 | | | 0.01 | August 15, 1961 |
| 192 | | Grovers Creek | 7.74 | 11 | 4,700 | U.S.G.S. See KP 41, Table 11 | |
| 193 | | Unnamed Stream | 0.08 | | | 0.03 | August 15, 1961 |
| 194 | | Unnamed Stream | 0.18 | | | 0.04 | August 15, 1961 |
| 195 | | Unnamed Stream | 0.17 | | | 0.03 | August 15, 1961 |
| 196 | | Unnamed Stream | 0.87 | | | U.S.G.S. See KP 42, Table 11 | |
| 197 | | Unnamed Stream | 0.15 | | | 0.01 | August 15, 1961 |
| 198 | | Thompson Creek | 2.62 | 15 | 2,100 | U.S.G.S. See KP 43, Table 11 | |
| 199 | | Unnamed Stream | 0.47 | | | Dry | August 15, 1961 |
| 200 | | Unnamed Stream | 0.28 | | | Dry | August 15, 1961 |
| 201 | | Unnamed Stream | 1.80 | 16 | 1,500 | U.S.G.S. See KP 44, Table 11 | |
| 202 | | Unnamed Stream | 1.45 | 17 | 1,300 | U.S.G.S. See KP 45, Table 11 | |
| 203 | | Unnamed Stream | 0.60 | | | 0.1 | August 16, 1961 |
| 204 | | Unnamed Stream | 0.10 | | | 0.03 | August 16, 1961 |
| 205 | | Unnamed Stream | 0.11 | | | Dry | August 16, 1961 |
| 206 | | Unnamed Stream | 0.24 | | | 0.07 | August 16, 1961 |
| 207 | 3 | West Fork Dogfish Creek | 2.80 | | | U.S.G.S. See KP 46, Table 11 | |
| | 2 | Dogfish Creek | 5.09 | | | See Figure 67 and U.S.G.S. 0700, Table 10 | |
| | 1 | East Unnamed Stream | 1.15 | | | U.S.G.S. See KP 47, Table 11 | |
| | | Dogfish Creek | 7.63 | 18 | 7,200 | See Figure 67; U.S.G.S. 0700, Table 10, and KP 47, Table 11 | |
| 208 | | Johnson Creek | 3.29 | 19 | 2,600 | U.S.G.S. See KP 48, Table 11 | |
| 209 | | Unnamed Stream | 0.07 | | | 0.03 | August 16, 1961 |
| 210 | | Unnamed Stream | 0.04 | | | Dry | August 16, 1961 |
| 211 | | Unnamed Stream | 0.04 | | | 0.03 | August 16, 1961 |
| 212 | | Unnamed Stream | 0.07 | | | 0.01 | August 16, 1961 |
| 213 | | Scandia Creek | 2.30 | 21 | 2,500 | 0.2 | August 16, 1961 |
| 214 | | Jacques Creek | 0.47 | | | U.S.G.S. See KP 49, Table 11 | |
| 215 | | Perry Creek | 0.20 | | | 0.02 | August 16, 1961 |
| 216 | | Unnamed Stream | 0.45 | | | U.S.G.S. See KP 50, Table 11 | |
| 217 | | Unnamed Stream | 0.23 | | | 0.03 | August 16, 1961 |
| 218 | | Unnamed Stream | 0.09 | | | U.S.G.S. See KP 51, Table 11 | |
| 219 | | Unnamed Stream | 0.06 | | | 0.02 | August 16, 1961 |
| 220 | | Unnamed Stream | 0.07 | | | 0.01 | August 16, 1961 |
| 221 | | Unnamed Stream | 0.38 | | | 0.08 | August 16, 1961 |
| 222 | | Unnamed Stream | 0.36 | | | 0.03 | August 16, 1961 |
| 223 | | Steel Creek | 4.75 | 21 | 5,300 | U.S.G.S. See KP 52, Table 11 | |
| 224 | | Unnamed Stream | 0.27 | | | 0.04 | August 16, 1961 |
| 225 | | Unnamed Stream | 0.47 | | | 0.05 | August 16, 1961 |
| 226 | | Unnamed Stream | 0.08 | | | 0.04 | August 16, 1961 |
| 227 | | Unnamed Stream | 0.44 | | | 0.03 | August 16, 1961 |
| 228 | | Illahee Creek | 1.28 | 22 | 1,500 | U.S.G.S. See KP 53, Table 11 | |
| 229 | | Unnamed Stream | 0.05 | | | 0.07 | August 16, 1961 |
| 230 | | Unnamed Stream | 0.06 | | | 0.05 | August 16, 1961 |
| 231 | | Unnamed Stream | 0.03 | | | 0.03 | August 16, 1961 |
| 232 | | Unnamed Stream | 0.22 | | | 0.1 | August 16, 1961 |

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area Square miles | Estimated mean annual effective precipitation from drainage area Inches | Acre-feet | Low flows CFS | Date |
|---|---|---|---|---|---|---|---|
| | | KITSAP PENINSULA | | | | | |
| 233 | | Unnamed Stream | 0.04 | | | 0.01 | August 16, 1961 |
| 234 | | Unnamed Stream | 0.01 | | | 0.02 | August 16, 1961 |
| 235 | | Enetai Springs | 0.02 | | | 0.06 | August 16, 1961 |
| 236 | | Unnamed Stream | 0.72 | | | U.S.G.S. | See KP 54, Table 11 |
| 237 | | Unnamed Stream | 0.31 | | | Dry | August 16, 1961 |
| 238 | | Unnamed Stream | 1.81 | 23 | 2,300 | 0.5 | August 16, 1961 |
| 239 | | Unnamed Stream | 0.23 | | | 0.05 | August 16, 1961 |
| 240 | | Unnamed Stream | 0.30 | | | U.S.G.S. | See KP 55, Table 11 |
| 241 | | Mosher Creek | 1.63 | 23 | 2,000 | U.S.G.S. | See KP 56, Table 11 |
| 242 | | Unnamed Stream | 0.48 | | | U.S.G.S. | See KP 57, Table 11 |
| 243 | | Unnamed Stream | 0.32 | | | U.S.G.S. | See KP 58, Table 11 |
| 244 | | Unnamed Stream | 0.14 | | | 0.1 | August 16, 1961 |
| 245 | | Barker Creek | 4.02 | 21 | 4,600 | U.S.G.S. | KP 59, Table 11 |
| 246 | 2 | Clear Creek | 3.78 | | | U.S.G.S. | See 0705, Table 10 and KP 60, Table 11 |
| | 2 | West Fork Clear Creek | 3.68 | | | U.S.G.S. | See KP 60, Table 11 |
| | | Clear Creek | 8.08 | 22 | 9,600 | U.S.G.S. | 0705, Table 10 |
| 247 | | Unnamed Stream | 0.47 | | | U.S.G.S. | See KP 61, Table 11 |
| 248 | | Strawberry Creek | 3.03 | 25 | 4,000 | U.S.G.S. | See KP 62, Table 11 |
| 249 | | Knapp Creek | 0.28 | | | U.S.G.S. | See KP 63, Table 11 |
| 250 | | Unnamed Stream | 0.55 | | | U.S.G.S. | See KP 64, Table 11 |
| 251 | | Woods Creek | 0.40 | | | U.S.G.S. | See KP 65, Table 11 |
| 252 | | Unnamed Stream | 0.17 | | | U.S.G.S. | See KP 66, Table 11 |
| 253 | | Unnamed Stream | 0.05 | | | U.S.G.S. | See KP 67, Table 11 |
| 254 | | Unnamed Stream | 0.04 | | | Dry | August 16, 1961 |
| 255 | | Unnamed Stream | 0.08 | | | 0.10 | August 16, 1961 |
| 256 | | Unnamed Stream | 0.10 | | | 0.07 | August 16, 1961 |
| 257 | | Unnamed Stream | 0.24 | | | U.S.G.S. | See KP 68, Table 11 |
| 258 | | Unnamed Stream | 0.18 | | | U.S.G.S. | See KP 69, Table 11 |
| 259 | 6 | Lost Creek | 3.08 | 44 | 7,100 | U.S.G.S. | See KP 69.5, Table 11 |
| | 6 | Wildcat Creek | 6.20 | 32 | 10,900 | U.S.G.S. | See KP 70.1, Table 11 |
| | 2 | Dickenson Creek | 2.19 | 41 | 4,800 | U.S.G.S. | See KP 71, Table 11 |
| | 1 | Kitsap Creek | 2.96 | 33 | 5,100 | U.S.G.S. | See KP 72, Table 11 |
| | | Chico Creek | 16.0 | 35 | 30,200 | U.S.G.S. | See 0720, Table 10 |
| 260 | | Unnamed Stream | 0.13 | | | 0.03 | August 16, 1961 |
| 261 | | Unnamed Stream | 0.28 | | | 0.01 | August 16, 1961 |
| 262 | | Unnamed Stream | 0.12 | | | 0.05 | August 16, 1961 |
| 263 | | Unnamed Stream | 0.72 | | | 0.01 | August 16, 1961 |
| 264 | | Unnamed Stream | 0.33 | | | 0.02 | August 16, 1961 |
| 265 | | Unnamed Stream | 0.82 | | | 0.02 | August 17, 1961 |
| 266 | | Wright Creek | 1.10 | 30 | 1,800 | 1.0 | August 17, 1961 |
| 267 | | Unnamed Stream | 0.48 | | | 0.3 | August 17, 1961 |
| 268 | 4 | Gorst Creek | 4.35 | 38 | 8,900 | U.S.G.S. | See KP 73, Table 11 |
| | 4 | Heins Creek | 1.63 | 41 | 3,600 | U.S.G.S. | See KP 74, Table 11 |
| | 3 | Parish Creek | 1.67 | 34 | 3,000 | U.S.G.S. | See KP 75, Table 11 |
| | 1 | South Unnamed Stream | 0.70 | | | 0.3 | August 17, 1961 |
| | | Gorst Creek | 9.08 | 37 | 18,000 | 12 | August 17, 1961 |
| 269 | | Unnamed Stream | 0.22 | | | 0.2 | August 17, 1961 |
| 270 | | Unnamed Stream | 0.73 | | | 0.2 | August 17, 1961 |
| 271 | | Unnamed Stream | 0.05 | | | 0.03 | August 17, 1961 |
| 272 | | Anderson Creek | 1.67 | 30 | 2,700 | 1.5 | August 17, 1961 |
| 273 | | Unnamed Stream | 0.05 | | | 0.04 | August 17, 1961 |
| 274 | | Unnamed Stream | 0.04 | | | 0.04 | August 17, 1961 |
| 275 | | Ross Creek | 2.26 | 30 | 3,600 | 3.0 | August 17, 1961 |
| 276 | | Unnamed Stream | 0.06 | | | 0.06 | August 17, 1961 |
| 277 | | Unnamed Stream | 0.08 | | | 0.03 | August 17, 1961 |
| 278 | | Unnamed Stream | 0.47 | | | 0.15 | August 17, 1961 |
| 279 | | Blackjack Creek | 12.4 | 30 | 19,600 | U.S.G.S. | See 0725, Table 10 |
| 280 | | Unnamed Stream | 0.24 | | | 0.02 | August 17, 1961 |
| 281 | | Unnamed Stream | 0.56 | | | 0.15 | August 17, 1961 |
| 282 | | Annapolis Creek | 1.86 | 27 | 2,700 | U.S.G.S. | See KP 78, Table 11 |
| 283 | | Unnamed Stream | 0.20 | | | U.S.G.S. | See KP 79, Table 11 |
| 284 | | Unnamed Stream | 0.07 | | | U.S.G.S. | See KP 80, Table 11 |
| 285 | | Sullivan Creek | 1.00 | 25 | 1,400 | U.S.G.S. | See KP 81, Table 11 |
| 286 | | Unnamed Stream | 0.25 | | | U.S.G.S. | See KP 82, Table 11 |

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area Square miles | Estimated mean annual effective precipitation from drainage area Inches | Acre-feet | Low flows CFS | Date |
|---|---|---|---|---|---|---|---|
| | | KITSAP PENINSULA | | | | | |
| 287 | | Unnamed Stream | 0.32 | | | U.S.G.S. | See KP 83, Table 11 |
| 288 | | Unnamed Stream | 0.54 | | | U.S.G.S. | See KP 84, Table 11 |
| 289 | | Beaver Creek | 1.87 | 24 | 2,400 | U.S.G.S. | See KP 85, Table 11 |
| 290 | | Unnamed Stream | 0.43 | | | 0.15 | August 17, 1961 |
| 291 | | Duncan Creek | 0.46 | | | U.S.G.S. | See KP 86, Table 11 |
| 292 | | Unnamed Stream | 0.02 | | | 0.03 | August 17, 1961 |
| 293 | | Unnamed Stream | 0.53 | | | 0.05 | August 17, 1961 |
| 294 | 11 | Salmonberry Creek | 5.21 | 27 | 7,500 | U.S.G.S. | See KP 87, Table 11 |
| | | Curley Creek | 14.2 | 27 | 20,500 | U.S.G.S. | See KP 88, Table 11 |
| 295 | | Unnamed Stream | 0.22 | | | U.S.G.S. | See KP 89, Table 11 |
| 296 | | Unnamed Stream | 0.06 | | | U.S.G.S. | See KP 90, Table 11 |
| 297 | | Unnamed Stream | 0.96 | | | U.S.G.S. | See KP 91, Table 11 |
| 298 | | Unnamed Stream | 0.42 | | | U.S.G.S. | See KP 92, Table 11 |
| 299 | | Unnamed Stream | 0.05 | | | 0.01 | August 17, 1961 |
| 300 | | Unnamed Stream | 0.14 | | | 0.01 | August 17, 1961 |
| 301 | | Unnamed Stream | 0.01 | | | 0.01 | August 17, 1961 |
| 302 | | Unnamed Stream | 0.79 | | | U.S.G.S. | See KP 93, Table 11 |
| 303 | | Unnamed Stream | 0.37 | | | 0.03 | August 17, 1961 |
| 304 | | Unnamed Stream | 0.02 | | | 0.01 | August 17, 1961 |
| 305 | | Wilson Creek | 1.58 | 25 | 2,100 | 1.5 | August 17, 1961 |
| 306 | | Unnamed Stream | 0.04 | | | 0.07 | August 17, 1961 |
| 307 | | Unnamed Stream | 0.10 | | | 0.05 | August 17, 1961 |
| 308 | | Phinney Creek | 1.71 | 26 | 2,600 | 1.0 | August 17, 1961 |
| 309 | | Unnamed Stream | 0.01 | | | 0.01 | August 17, 1961 |
| 310 | | Unnamed Stream | 0.01 | | | 0.01 | August 17, 1961 |
| 311 | | Unnamed Stream | 0.05 | | | 0.04 | August 17, 1961 |
| 312 | | Unnamed Stream | 0.08 | | | 0.02 | August 17, 1961 |
| 313 | 5 | Olalla Creek | 4.13 | | | U.S.G.S. | See KP 94, Table 11 |
| | | Olalla Creek | 7.51 | 28 | 10,900 | 3.5 | August 17, 1961 |
| 314 | | Unnamed Stream | 0.81 | | | 0.4 | August 17, 1961 |
| 315 | | Unnamed Stream | 0.05 | | | 0.02 | August 17, 1961 |
| 316 | | Unnamed Stream | 0.24 | | | 0.03 | August 17, 1961 |
| 317 | | Unnamed Stream | 0.27 | | | 0.02 | August 17, 1961 |
| 318 | | Unnamed Stream | 0.12 | | | 0.03 | August 17, 1961 |
| 319 | | Unnamed Stream | 0.14 | | | 0.04 | August 17, 1961 |
| 320 | | Unnamed Stream | 0.02 | | | 0.03 | August 17, 1961 |
| 321 | | Crescent Creek | 5.58 | 26 | 7,800 | U.S.G.S. | See KP 95, Table 11 |
| 322 | | North Creek | 2.04 | 26 | 2,900 | 0.15 | August 17, 1961 |
| 323 | | Unnamed Stream | 0.02 | | | 0.01 | August 17, 1961 |
| 324 | | Unnamed Stream | 0.51 | | | 0.04 | August 18, 1961 |
| 325 | | Unnamed Stream | 0.09 | | | 0.05 | August 18, 1961 |
| 326 | | Unnamed Stream | 0.45 | | | 0.05 | August 18, 1961 |
| 327 | | Sullivan Creek | 1.68 | 23 | 2,100 | U.S.G.S. | See KP 96, Table 11 |
| 328 | | Unnamed Stream | 1.87 | 24 | 2,400 | U.S.G.S. | See KP 97, Table 11 |
| 329 | | Unnamed Stream | 2.53 | 26 | 3,500 | U.S.G.S. | See KP 98, Table 11 |
| 330 | | Artondale Creek | 2.99 | 26 | 4,200 | U.S.G.S. | See KP 99, Table 11 |
| 331 | | Unnamed Stream | 0.03 | | | 0.02 | August 18, 1961 |
| 332 | | Unnamed Stream | 0.40 | | | 0.01 | August 18, 1961 |
| 333 | | Unnamed Stream | 0.04 | | | 0.01 | August 18, 1961 |
| 334 | | Unnamed Stream | 0.06 | | | 0.01 | August 18, 1961 |
| 335 | | Unnamed Stream | 0.10 | | | U.S.G.S. | See KP 100, Table 11 |
| 336 | | Unnamed Stream | 0.03 | | | 0.01 | August 18, 1961 |
| 337 | | Muri Creek | 0.53 | | | 0.1 | August 18, 1961 |
| 338 | | Unnamed Stream | 0.19 | | | U.S.G.S. | See KP 101, Table 11 |
| 339 | | Warren Creek | 0.86 | | | U.S.G.S. | See KP 102, Table 11 |
| 340 | | Unnamed Stream | 0.16 | | | U.S.G.S. | See KP 103, Table 11 |
| 341 | | Unnamed Stream | 0.15 | | | 0.04 | August 18, 1961 |
| 342 | | Unnamed Stream | 2.03 | 27 | 2,900 | U.S.G.S. | See KP 104, Table 11 |
| 343 | | Meyer Creek | 0.25 | | | U.S.G.S. | See KP 105, Table 11 |
| 344 | | Unnamed Stream | 1.02 | | | U.S.G.S. | See KP 106, Table 11 |
| 345 | | Unnamed Stream | 0.49 | | | Dry | August 18, 1961 |
| 346 | | Unnamed Stream | 0.05 | | | 0.02 | August 18, 1961 |
| 347 | | Unnamed Stream | 0.02 | | | 0.01 | August 18, 1961 |
| 348 | | Unnamed Stream | 0.03 | | | 0.01 | August 18, 1961 |
| 349 | | Marble Creek | 0.75 | | | 0.03 | August 18, 1961 |
| 350 | | McCormick Creek | 2.36 | 27 | 3,400 | U.S.G.S. | See KP 107, Table 11 |

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area | Estimated mean annual effective precipitation from drainage area | | Low flows | Date |
|---|---|---|---|---|---|---|---|
| | | | Square miles | Inches | Acre-feet | CFS | |
| | | | KITSAP PENINSULA | | | | |
| 351 | | Unnamed Stream | 0.13 | | | 0.02 | August 18, 1961 |
| 352 | | Unnamed Stream | 1.56 | 28 | 2,300 | U.S.G.S. | See KP 108, Table 11 |
| 353 | | Unnamed Stream | 0.26 | | | 0.02 | August 18, 1961 |
| 354 | | Purdy Creek | 3.47 | 29 | 5,400 | U.S.G.S. | See KP 109, Table 11 |
| 355 | | Unnamed Stream | 0.30 | | | 0.02 | August 18, 1961 |
| 356 | 2 | Bear Creek | 1.99 | 31 | 3,300 | U.S.G.S. | See KP 111, Table 11 |
| | | Burley Creek | 10.8 | 30 | 17,400 | U.S.G.S. | See 0730, Table 10 |
| 357 | | Unnamed Stream | 0.49 | | | 0.08 | August 18, 1961 |
| 358 | | Unnamed Stream | 0.04 | | | 0.02 | August 18, 1961 |
| 359 | | Unnamed Stream | 0.03 | | | 0.02 | August 18, 1961 |
| 360 | | Unnamed Stream | 0.03 | | | 0.02 | August 18, 1961 |
| 361 | | Unnamed Stream | 0.16 | | | 0.03 | August 18, 1961 |
| 362 | | Unnamed Stream | 0.02 | | | 0.08 | August 18, 1961 |
| 363 | | Unnamed Stream | 0.01 | | | 0.01 | August 18, 1961 |
| 364 | | Unnamed Stream | 0.38 | | | 0.4 | August 18, 1961 |
| 365 | | Unnamed Stream | 0.40 | | | Dry | August 18, 1961 |
| 366 | | Unnamed Stream | 0.38 | | | 0.04 | August 18, 1961 |
| 367 | 2 | Minter Creek | 5.81 | 32 | 9,900 | U.S.G.S. | See KP 113, Table 11 |
| | 2 | Huge Creek | 6.52 | 32 | 11,300 | U.S.G.S. | See 0735, Table 10 |
| | | Minter Creek | 15.9 | 32 | 27,000 | 15 | August 18, 1961 |
| 368 | | Unnamed Stream | 0.88 | | | 0.04 | August 18, 1961 |
| 369 | | Lackey Creek | 2.53 | 31 | 4,200 | 0.1 | August 18, 1961 |
| 370 | | Unnamed Stream | 0.40 | | | 0.03 | August 18, 1961 |
| 371 | | Unnamed Stream | 0.01 | | | 0.02 | August 18, 1961 |
| 372 | | Unnamed Stream | 0.25 | | | 0.07 | August 18, 1961 |
| 373 | | Unnamed Stream | 0.19 | | | 0.1 | August 18, 1961 |
| 374 | | Unnamed Stream | 0.09 | | | 0.08 | August 18, 1961 |
| 375 | | Unnamed Stream | 1.23 | 30 | 1,900 | U.S.G.S. | See KP 116, Table 11 |
| 376 | | Unnamed Stream | 2.60 | 30 | 4,100 | U.S.G.S. | See KP 117, Table 11 |
| 377 | | Unnamed Stream | 0.09 | | | 0.01 | August 11, 1961 |
| 378 | | Unnamed Stream | 0.30 | | | Dry | August 11, 1961 |
| 379 | | Unnamed Stream | 0.24 | | | 0.01 | August 11, 1961 |
| 380 | | Bay Lake Outlet | 1.24 | 29 | 1,900 | 0.2 | August 11, 1961 |
| 381 | | Unnamed Stream | 0.23 | | | 0.01 | August 11, 1961 |
| 382 | | Unnamed Stream | 0.19 | | | 0.03 | August 11, 1961 |
| 383 | | Unnamed Stream | 0.32 | | | Dry | August 11, 1961 |
| 384 | | Unnamed Stream | 0.66 | | | 0.01 | August 11, 1961 |
| 385 | | Unnamed Stream | 2.28 | 29 | 3,500 | 0.1 | August 11, 1961 |
| 386 | | Unnamed Stream | 0.23 | | | 0.01 | August 11, 1961 |
| 387 | | Unnamed Stream | 0.21 | | | 0.01 | August 11, 1961 |
| 388 | | Unnamed Stream | 0.46 | | | 0.01 | August 11, 1961 |
| 389 | | Unnamed Stream | 0.03 | | | 0.01 | August 11, 1961 |
| 390 | | Unnamed Stream | 0.57 | | | 0.2 | August 11, 1961 |
| 391 | | Unnamed Stream | 0.06 | | | 0.01 | August 11, 1961 |
| 392 | | Unnamed Stream | 0.44 | | | 0.02 | August 11, 1961 |
| 393 | | Unnamed Stream | 0.14 | | | 0.01 | August 11, 1961 |
| 394 | | Unnamed Stream | 0.15 | | | 0.01 | August 11, 1961 |
| 395 | | Unnamed Stream | 3.16 | 29 | 5,000 | 0.04 | August 11, 1961 |
| 396 | | Unnamed Stream | 0.11 | | | 0.01 | August 11, 1961 |
| 397 | | Unnamed Stream | 0.41 | | | 0.04 | August 11, 1961 |
| 398 | | Unnamed Stream | 0.24 | | | 0.03 | August 11, 1961 |
| 399 | | Herron Lake Outlet | 0.64 | | | 0.04 | August 11, 1961 |
| 400 | | Unnamed Stream | 1.43 | 30 | 2,300 | 0.2 | August 11, 1961 |
| 401 | | Unnamed Stream | 1.16 | 30 | 1,900 | 0.1 | August 11, 1961 |
| 402 | | Dutcher Creek | 2.98 | 30 | 4,800 | U.S.G.S. | See KP 118, Table 11 |
| 403 | | Unnamed Stream | 0.05 | | | 0.1 | August 11, 1961 |
| 404 | | Unnamed Stream | 0.06 | | | 0.05 | August 11, 1961 |
| 405 | | Maple Creek | 0.06 | | | 0.1 | August 11, 1961 |
| 406 | | Unnamed Stream | 0.01 | | | 0.10 | August 11, 1961 |
| 407 | | Unnamed Stream | 0.11 | | | 0.3 | August 11, 1961 |
| 408 | | Unnamed Stream | 0.08 | | | Dry | August 11, 1961 |
| 409 | | Unnamed Stream | 0.30 | | | Dry | August 11, 1961 |
| 410 | | Unnamed Stream | 1.30 | 31 | 2,100 | U.S.G.S. | See KP 119, Table 11 |
| 411 | | Unnamed Stream | 2.75 | 31 | 4,600 | U.S.G.S. | See KP 120, Table 11 |
| 412 | | Unnamed Stream | 0.18 | | | Dry | August 11, 1961 |
| 413 | | Unnamed Stream | 0.19 | | | Dry | August 11, 1961 |
| 414 | | Unnamed Stream | 0.03 | | | 0.01 | August 11, 1961 |

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area | Estimated mean annual effective precipitation from drainage area | | Low flows | Date |
|---|---|---|---|---|---|---|---|
| | | | Square miles | Inches | Acre-feet | CFS | |
| | | KITSAP PENINSULA | | | | | |
| 415 | | Rocky Creek | 18.3 | 33 | 32,300 | U.S.G.S. See KP 121, Table 11 | |
| 416 | | Unnamed Stream | 0.15 | | | 0.2 | August 11, 1961 |
| 417 | | Unnamed Stream | 0.11 | | | 0.05 | August 11, 1961 |
| 418 | | Unnamed Stream | 0.60 | | | 0.08 | August 11, 1961 |
| 419 | | Sisson Creek | 0.54 | | | 0.1 | August 11, 1961 |
| 420 | | Unnamed Stream | 0.12 | | | 0.06 | August 11, 1961 |
| 421 | | Unnamed Stream | 0.05 | | | Dry | August 11, 1961 |
| 422 | | Unnamed Stream | 0.14 | | | 0.03 | August 11, 1961 |
| 423 | | Unnamed Stream | 0.26 | | | 0.1 | August 11, 1961 |
| 424 | | Unnamed Stream | 0.06 | | | 0.1 | August 11, 1961 |
| 425 | | Coulter Creek | 14.1 | 34 | 25,700 | U.S.G.S. See KP 125, Table 11 | |
| 426 | | Unnamed Stream | 0.77 | | | 0.02 | August 11, 1961 |
| | | BAINBRIDGE ISLAND | | | | | |
| 427 | | Unnamed Stream | 0.08 | | | 0.02 | August 15, 1961 |
| 428 | | Unnamed Stream | 0.09 | | | 0.01 | August 15, 1961 |
| 429 | | Unnamed Stream | 0.30 | | | 0.10 | August 15, 1961 |
| 430 | | Unnamed Stream | 0.49 | | | 0.04 | August 15, 1961 |
| 431 | | Port Madison Creek | 0.62 | | | 0.05 | August 15, 1961 |
| 433 | | Unnamed Stream | 0.39 | | | 0.02 | August 15, 1961 |
| 434 | | Unnamed Stream | 1.56 | 16 | 1,900 | 0.1 | August 15, 1961 and U.S.G.S. See BA 1, Table 11 |
| 435 | | Unnamed Stream | 0.15 | | | 0.02 | August 15, 1961 |
| 436 | | Unnamed Stream | 0.47 | | | 0.01 | August 15, 1961 |
| 437 | | Unnamed Stream | 0.54 | | | 0.03 | August 15, 1961 |
| 438 | | Unnamed Stream | 0.37 | | | 0.02 | August 15, 1961 |
| 439 | | Unnamed Stream | 0.78 | | | 0.1 | August 15, 1961 |
| 440 | | Unnamed Stream | 0.34 | | | 0.02 | August 15, 1961 |
| 441 | | Unnamed Stream | 0.18 | | | Dry | August 15, 1961 |
| 442 | | Unnamed Stream | 0.49 | | | 0.04 | August 15, 1961 |
| 443 | | Unnamed Stream | 0.52 | | | 0.03 | August 15, 1961 |
| 444 | | Unnamed Stream | 0.25 | | | Dry | August 15, 1961 |
| 445 | | Unnamed Stream | 0.09 | | | Dry | August 15, 1961 |
| 446 | | Unnamed Stream | 0.08 | | | 0.01 | August 15, 1961 |
| 447 | | Unnamed Stream | 0.08 | | | Dry | August 15, 1961 |
| 448 | | Unnamed Stream | 0.08 | | | 0.01 | August 15, 1961 |
| 449 | | Unnamed Stream | 0.14 | | | Dry | August 15, 1961 |
| 450 | | Unnamed Stream | 0.08 | | | Dry | August 15, 1961 |
| 451 | | Unnamed Stream | 0.17 | | | Dry | August 15, 1961 |
| 452 | | Unnamed Stream | 1.04 | 19 | 1,100 | Dry | August 15, 1961 |
| 453 | | Unnamed Stream | 0.07 | | | Dry | August 15, 1961 |
| 454 | | Unnamed Stream | 0.05 | | | 0.01 | August 15, 1961 |
| 455 | | Unnamed Stream | 0.13 | | | 0.01 | August 15, 1961 |
| 456 | | Unnamed Stream | 0.11 | | | 0.01 | August 15, 1961 |
| 457 | | Unnamed Stream | 0.05 | | | 0.04 | August 15, 1961 |
| 458 | | Unnamed Stream | 0.17 | | | 0.02 | August 15, 1961 |
| 459 | | Unnamed Stream | 0.18 | | | 0.06 | August 15, 1961 |
| 460 | | Unnamed Stream | 0.17 | | | Dry | August 15, 1961 |
| 461 | | Unnamed Stream | 2.05 | 18 | 1,900 | 0.4 | August 15, 1961 and U.S.G.S. See BA 2, Table 11 |
| 462 | | Unnamed Stream | 0.33 | | | Dry | August 15, 1961 |
| 463 | | Unnamed Stream | 1.75 | 16 | 1,300 | 0.2 | August 15, 1961 and U.S.G.S. See BA 3, Table 11 |
| 464 | | Unnamed Stream | 0.07 | | | 0.01 | August 15, 1961 |
| | | VASHON ISLAND AND MAURY ISLAND | | | | | |
| 465 | | Unnamed Stream | 0.09 | | | 0.03 | August 21, 1961 |
| 466 | | Unnamed Stream | 0.03 | | | 0.01 | August 21, 1961 |
| 467 | | Unnamed Stream | 0.17 | | | Dry | August 21, 1961 |
| 468 | | Unnamed Stream | 0.01 | | | 0.20 | August 21, 1961 |
| 469 | | Unnamed Stream | 0.06 | | | 0.10 | August 21, 1961 |
| 470 | | Unnamed Stream | 0.11 | | | 0.01 | August 21, 1961 |
| 471 | | Unnamed Stream | 0.14 | | | 0.03 | August 21, 1961 |

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area | Estimated mean annual effective precipitation from drainage area | | Low flows | Date |
|---|---|---|---|---|---|---|---|
| | | | Square miles | Inches | Acre-Feet | CFS | |
| | | VASHON ISLAND AND MAURY ISLAND | | | | | |
| 472 | | Unnamed Stream | 0.02 | | | 0.01 | August 21, 1961 |
| 473 | | Unnamed Stream | 0.06 | | | 0.03 | August 21, 1961 |
| 474 | | Unnamed Stream | 0.06 | | | 0.04 | August 21, 1961 |
| 475 | | Unnamed Stream | 0.12 | | | 0.01 | August 21, 1961 |
| 476 | | Unnamed Stream | 0.08 | | | 0.03 | August 21, 1961 |
| 477 | | Unnamed Stream | 0.64 | | | 0.08 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 1, Table 11 |
| 478 | | Unnamed Stream | 0.50 | | | 0.2 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 2, Table 11 |
| 479 | | Beall Creek | 0.23 | | | 0.3 | August 21, 1961 |
| 480 | | Unnamed Stream | 0.02 | | | 0.05 | August 21, 1961 |
| 481 | | Unnamed Stream | 0.96 | | | 0.2 | August 21, 1961 |
| | | | | | | U.S.G.S. | See VA 3, Table 11 |
| 482 | | Unnamed Stream | 0.73 | | | 0.1 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 4, Table 11 |
| 483 | | Unnamed Stream | 0.20 | | | 0.03 | August 21, 1961 |
| 484 | | Unnamed Stream | 0.34 | | | Dry | August 21, 1961 and |
| | | | | | | U.S.G.S. | See MA 1, Table 11 |
| 485 | | Unnamed Stream | 0.06 | | | 0.01 | August 21, 1961 |
| 486 | | Unnamed Stream | 0.05 | | | Dry | August 21, 1961 |
| 487 | | Unnamed Stream | 0.05 | | | Dry | August 21, 1961 |
| 488 | | Unnamed Stream | 0.05 | | | 0.02 | August 21, 1961 |
| 489 | | Unnamed Stream | 0.07 | | | Dry | August 21, 1961 |
| 490 | | Unnamed Stream | 0.07 | | | Dry | August 21, 1961 |
| 491 | | Unnamed Stream | 0.05 | | | Dry | August 21, 1961 |
| 492 | | Unnamed Stream | 0.03 | | | Dry | August 21, 1961 |
| 493 | | Unnamed Stream | 0.03 | | | Dry | August 21, 1961 |
| 494 | | Unnamed Stream | 0.05 | | | Dry | August 21, 1961 |
| 495 | | Unnamed Stream | 0.05 | | | Dry | August 21, 1961 |
| 496 | | Unnamed Stream | 0.01 | | | Dry | August 21, 1961 |
| 497 | | Unnamed Stream | 0.03 | | | Dry | August 21, 1961 |
| 498 | | Unnamed Stream | 0.03 | | | Dry | August 21, 1961 |
| 499 | | Unnamed Stream | 0.05 | | | Dry | August 21, 1961 |
| 500 | | Unnamed Stream | 0.35 | | | 0.05 | August 21, 1961 |
| 501 | | Unnamed Stream | 0.23 | | | 0.08 | August 21, 1961 |
| 502 | | Unnamed Stream | 0.04 | | | 0.01 | August 21, 1961 |
| 503 | | Unnamed Stream | 0.26 | | | 0.03 | August 21, 1961 |
| 504 | | Unnamed Stream | 0.23 | | | Dry | August 21, 1961 |
| 505 | | Unnamed Stream | 0.29 | | | Dry | August 21, 1961 |
| 506 | | Unnamed Stream | 0.53 | | | 0.02 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See MA 2, Table 11 |
| 507 | | Unnamed Stream | 0.50 | | | 0.01 | August 21, 1961 |
| 508 | | Unnamed Stream | 0.20 | | | 0.02 | August 21, 1961 |
| 509 | | Unnamed Stream | 0.43 | | | 0.03 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 5, Table 11 |
| 510 | | Judd Creek | 5.18 | 23 | 6,300 | 0.5 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 6, Table 11 |
| 511 | | Unnamed Stream | 0.06 | | | 0.02 | August 21, 1961 |
| 512 | | Unnamed Stream | 0.02 | | | Dry | August 21, 1961 |
| 513 | | Unnamed Stream | 0.03 | | | Dry | August 21, 1961 |
| 514 | | Fisher Creek | 1.95 | 23 | 2,400 | 0.4 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 7, Table 11 |
| 515 | | Unnamed Stream | 0.06 | | | Dry | August 21, 1961 |
| 516 | | Unnamed Stream | 0.44 | | | 0.1 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 8, Table 11 |
| 517 | | Unnamed Stream | 0.63 | | | 0.1 | August 21, 1961 |
| 518 | | Tahlequah Creek | 1.17 | 23 | 1,400 | 0.15 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 9, Table 11 |
| 519 | | Unnamed Stream | 0.03 | | | 0.01 | August 21, 1961 |
| 520 | | Unnamed Stream | 0.02 | | | 0.01 | August 21, 1961 |
| 521 | | Unnamed Stream | 0.04 | | | 0.01 | August 21, 1961 |
| 522 | | Unnamed Stream | 0.06 | | | 0.07 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 10, Table 11 |
| 523 | | Unnamed Stream | 0.05 | | | 0.02 | August 21, 1961 |
| 524 | | Unnamed Stream | 0.24 | | | 0.1 | August 21, 1961 |
| 525 | | Unnamed Stream | 0.17 | | | 0.05 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 11, Table 11 |

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area | Estimated mean annual effective precipitation from drainage area | | Low flows | Date |
|---|---|---|---|---|---|---|---|
| | | | Square miles | Inches | Acre-feet | CFS | |
| | | **VASHON ISLAND AND MAURY ISLAND** | | | | | |
| 526 | | Unnamed Stream | 0.40 | | | 0.1 | August 21, 1961 |
| 527 | | Unnamed Stream | 0.11 | | | 0.03 | August 21, 1961 |
| 528 | | Unnamed Stream | 0.05 | | | 0.01 | August 21, 1961 |
| 529 | | Unnamed Stream | 0.28 | | | 0.1 | August 21, 1961 |
| 530 | | Jod Creek | 0.77 | 24 | 1,100 | 0.3 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 12, Table 11 |
| 531 | | Green Valley Creek | 0.45 | 24 | 600 | 0.15 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 13, Table 11 |
| 532 | | Unnamed Stream | 0.22 | | | 0.2 | August 21, 1961 |
| 533 | | Unnamed Stream | 0.21 | | | 0.08 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 14, Table 11 |
| 534 | | Unnamed Stream | 0.22 | | | 0.20 | August 21, 1961 |
| 535 | | Unnamed Stream | 0.06 | | | 0.04 | August 21, 1961 |
| 536 | | Unnamed Stream | 0.05 | | | 0.04 | August 21, 1961 |
| 537 | | Unnamed Stream | 0.36 | | | 0.15 | August 21, 1961 |
| 538 | | Unnamed Stream | 0.19 | | | 0.03 | August 21, 1961 |
| 539 | | Unnamed Stream | 0.02 | | | 0.01 | August 21, 1961 |
| 540 | | Needle Creek | 2.93 | 23 | 3,500 | 1.5 | August 21, 1961 and |
| | | | | | | U.S.G.S. | See VA 15, Table 11 |
| 541 | | Unnamed Stream | 0.24 | | | 0.1 | August 21, 1961 |
| 542 | | Unnamed Stream | 0.07 | | | 0.03 | August 21, 1961 |
| 543 | | Unnamed Stream | 0.05 | | | 0.01 | August 21, 1961 |
| 544 | | Unnamed Stream | 0.07 | | | 0.01 | August 21, 1961 |
| 545 | | Unnamed Stream | 0.10 | | | 0.03 | August 21, 1961 |
| 546 | | Unnamed Stream | 0.12 | | | 0.02 | August 21, 1961 |
| 547 | | Unnamed Stream | 0.06 | | | 0.01 | August 21, 1961 |
| | | **FOX ISLAND** | | | | | |
| 548 | | Myrtle Creek | 0.16 | | | 0.03 | August 18, 1961 |
| 549 | | Spring Creek | 0.15 | | | 0.03 | August 18, 1961 |
| 550 | | Unnamed Stream | 0.03 | | | 0.03 | August 18, 1961 |
| 551 | | Unnamed Stream | 0.04 | | | 0.05 | August 18, 1961 |
| 552 | | Unnamed Stream | 0.13 | | | 0.08 | August 18, 1961 |
| 553 | | Unnamed Stream | 0.02 | | | 0.05 | August 18, 1961 |
| 554 | | Unnamed Stream | 0.03 | | | 0.01 | August 18, 1961 |
| 555 | | Unnamed Stream | 0.06 | | | Dry | August 18, 1961 |
| | | **McNEIL ISLAND** | | | | | |
| 556 | | Unnamed Stream | 0.96 | 25 | 1,300 | No measurement or estimate | |
| 557 | | Eden Creek | 1.08 | 26 | 1,500 | No measurement or estimate | |
| 558 | | Luhr Creek | 0.61 | | | No measurement or estimate | |
| 559 | | Bradley Creek | 0.65 | | | No measurement or estimate | |
| | | **ANDERSON ISLAND** | | | | | |
| 560 | | Unnamed Stream | 0.03 | | | 0.05 | September 11, 1961 |
| 561 | | Unnamed Stream | 0.23 | | | 0.02 | September 11, 1961 |
| 562 | | Unnamed Stream | 0.04 | | | Dry | September 11, 1961 |
| 563 | | Unnamed Stream | 0.22 | | | 0.08 | September 11, 1961 |
| 564 | | Unnamed Stream | 0.11 | | | 0.01 | September 11, 1961 |
| 565 | | Josephine Lake Outlet | 1.03 | 26 | 1,400 | No measurement or estimate | |
| 566 | | Unnamed Stream | 0.14 | | | 0.03 | September 11, 1961 |
| 567 | | Unnamed Stream | 0.17 | | | 0.15 | September 11, 1961 |
| 568 | | Unnamed Stream | 0.09 | | | 0.08 | September 11, 1961 |
| 569 | | Unnamed Stream | 0.17 | | | 0.01 | September 11, 1961 |
| 570 | | Unnamed Stream | 1.28 | 27 | 1,800 | 0.4 | September 11, 1961 |
| 571 | | Unnamed Stream | 0.05 | | | 0.01 | September 11, 1961 |

Table 48. SURFACE WATER EVALUATION. (Continued)

| Stream No. | Confluence No. | Name of stream above confluence | Surface drainage area | Estimated mean annual effective precipitation from drainage area | | Low flows | Date |
|---|---|---|---|---|---|---|---|
| | | | Square miles | Inches | Acre-feet | CFS | |
| | | | ANDERSON ISLAND | | | | |
| 572 | | Unnamed Stream | 0.03 | | | 0.04 | September 11, 1961 |
| 573 | | Unnamed Stream | 0.01 | | | 0.04 | September 11, 1961 |
| 574 | | Unnamed Stream | 0.03 | | | 0.03 | September 11, 1961 |
| 575 | | Unnamed Stream | 0.10 | | | 0.01 | September 11, 1961 |
| 576 | | Unnamed Stream | 0.04 | | | 0.01 | September 11, 1961 |
| 577 | | Unnamed Stream | 0.12 | | | 0.01 | September 11, 1961 |
| 578 | | Unnamed Stream | 0.13 | | | 0.1 | September 11, 1961 |
| 579 | | Unnamed Stream | 0.03 | | | 0.03 | September 11, 1961 |
| 580 | | Unnamed Stream | 0.11 | | | 0.05 | September 11, 1961 |
| 581 | | Unnamed Stream | 0.16 | | | 0.03 | September 11, 1961 |
| 582 | | Unnamed Stream | 0.72 | | | 0.25 | September 11, 1961 |

Table 49. STATISTICS SHOWING THE VARIATION OF MEASURED WATER-YEAR RUNOFF.

| Gage No. | Stream name | Period of analysis: No. of years | Period of analysis: Dates | $\overline{X}$ Mean for period Inches | S Standard deviation Inches | 3S Three st'd. deviations Inches | PE Probable error Inches | CV Coeff. of variation % |
|---|---|---|---|---|---|---|---|---|
| 0630 | Union River | 14 | 46-59 | 51.56 | 10.80 | 32.39 | 7.28 | 20.94 |
| | | 10 | 46-55 | 52.05 | 9.29 | 27.88 | 6.27 | 17.86 |
| | | 5 | 46-50 | 50.18 | 9.57 | 28.70 | 6.45 | 19.07 |
| | | 5 | 51-55 | 53.92 | 9.70 | 29.10 | 6.54 | 17.99 |
| 0635 | Union River | 12 | 48-59 | 36.39 | 8.97 | 26.91 | 6.05 | 24.65 |
| | | 5 | 51-55 | 35.09 | 10.56 | 31.69 | 7.12 | 30.10 |
| 0645 | Mission Creek | 8 | 46-53 | 49.23 | 9.33 | 27.98 | 6.29 | 18.95 |
| | | 5 | 46-50 | 47.88 | 10.05 | 30.14 | 6.78 | 20.98 |
| 0650 | Mission Creek | 7 | 46-52 | 37.97 | 8.41 | 25.23 | 5.67 | 22.15 |
| | | 5 | 46-50 | 36.51 | 7.56 | 22.67 | 5.10 | 20.70 |
| 0655 | Gold Creek | 15 | 46-60 | 54.27 | 10.08 | 30.25 | 6.80 | 18.58 |
| | | 10 | 46-55 | 53.24 | 8.70 | 26.08 | 5.86 | 16.33 |
| | | 10 | 51-60 | 54.58 | 11.06 | 33.17 | 7.46 | 20.26 |
| | | 5 | 46-50 | 53.65 | 8.95 | 26.84 | 6.04 | 16.68 |
| | | 5 | 51-55 | 52.84 | 9.47 | 28.40 | 6.38 | 17.92 |
| | | 5 | 56-60 | 56.33 | 13.34 | 40.00 | 8.99 | 23.67 |
| 0660 | Tahuya River | 11 | 46-56 | 50.61 | 11.59 | 34.76 | 7.82 | 22.89 |
| | | 10 | 46-55 | 48.57 | 9.90 | 29.71 | 6.68 | 20.39 |
| | | 5 | 46-50 | 47.59 | 8.42 | 25.25 | 5.68 | 17.69 |
| | | 5 | 51-55 | 49.55 | 12.14 | 36.43 | 8.19 | 24.51 |
| 0670 | Panther Creek | 8 | 46-53 | 41.50 | 6.24 | 18.71 | 4.21 | 15.03 |
| | | 5 | 46-50 | 41.26 | 6.07 | 18.21 | 4.10 | 14.71 |
| 0675 | Tahuya River | 11 | 46-56 | 43.91 | 9.60 | 28.81 | 6.48 | 21.87 |
| | | 10 | 46-55 | 41.99 | 7.57 | 22.71 | 5.11 | 18.03 |
| | | 5 | 46-50 | 41.25 | 7.93 | 23.78 | 5.35 | 19.22 |
| | | 5 | 51-55 | 42.72 | 8.05 | 24.14 | 5.43 | 18.84 |
| 0685 | Dewatto Creek | 9 | 48-54<br>59-60 | 51.32 | 5.65 | 16.96 | 3.81 | 11.01 |
| 0700 | Dogfish Creek | 13 | 48-60 | 24.26 | 3.90 | 11.68 | 2.63 | 16.06 |
| | | 10 | 51-60 | 24.65 | 4.40 | 13.21 | 2.97 | 17.87 |
| | | 5 | 51-55 | 23.22 | 4.38 | 13.16 | 2.96 | 18.88 |
| | | 5 | 56-60 | 26.09 | 4.39 | 13.17 | 2.96 | 16.83 |
| 0720 | Chico Creek | 3 | 48-50 | 34.26 | ---- | ---- | --- | ---- |
| 0725 | Blackjack Creek | 3 | 48-50 | 24.46 | ---- | ---- | --- | ---- |
| 0730 | Burley Creek | 3 | 48-50 | 34.94 | ---- | ---- | --- | ---- |
| 0735 | Huge Creek | 13 | 48-60 | 24.79 | 6.46 | 19.36 | 4.35 | 26.04 |
| | | 10 | 51-60 | 25.00 | 6.78 | 20.33 | 4.57 | 27.10 |
| | | 5 | 51-55 | 23.91 | 7.73 | 23.19 | 5.21 | 32.32 |
| | | 5 | 56-60 | 26.09 | 6.37 | 19.11 | 4.30 | 24.42 |

Table 50. EXISTING LAKES AND RESERVOIRS IN THE REPORT AREA.*

| Location Township | Range | Section | Name | Approximate elevation above sea level in feet | Approximate area in acres | Drainage |
|---|---|---|---|---|---|---|
| KING COUNTY | | | | | | |
| T22N | R2E | 13 | Wildwood Pond | 350 | 1.7 | Quartermaster Harbor |
| T22N | R3E | 6 | Matsuda Reservoir | 300 | 1.0 | Judd Creek & Quartermaster Harbor |
| | | 16 | Unnamed Lake | 20 | 1.2 | Puget Sound |
| T23N | R3E | 30 | Unnamed Lake | 285 | 1.3 | Unnamed stream to Fern Cove |
| | | 31 | Unnamed Lake | 340 | 3.1 | Judd Creek & Quartermaster Harbor |
| KITSAP COUNTY | | | | | | |
| T22N | R1W | 1 | Unnamed Lake | 310 | 3.0 | Rocky Creek to Case Inlet |
| | | 2 | Wye Lake | 300 | 37.9 | Fern Lake to Rocky Creek & Case Inlet |
| | | 10 | Fern Lake | 210 | 19.0 | Rocky Creek to Case Inlet |
| | | 11 | Unnamed Lake | 290 | 1.1 | Rocky Creek to Case Inlet |
| T23N | R1W | 15 | Lider Lake | 310 | 2.8 | Union River to Hood Canal |
| | | 24 | Unnamed Lake | 350 | 2.0 | Coulter Creek to North Bay |
| | | 26 | Kriegler Lake | 320 | 10.5 | Coulter Creek to North Bay |
| | | 36 | Unnamed Lake | 390 | 3.0 | Rocky Creek to Case Inlet |
| | | 36 | Bear Lake | 400 | 12.1 | Rocky Creek to Case Inlet |
| T23N | R2W | 3 | Unnamed Lake | 450 | | Tahuya River |
| T24N | R1W | 2 | Wildcat Lake | 377 | 111.6 | Wildcat Creek to Dyes Inlet |
| | | 9 | Scout Lake | 875 | 3.0 | Tin Mine Creek to Tahuya River |
| | | 17 | Tahuya Lake | 580 | 17.9 | Tahuya River |
| | | 22 | Unnamed Lake | 780 | 4.0 | Gold Creek to Tahuya River |
| | | 26 | Union River Reservoir | 640 | 93.0 | Union River to Hood Canal |
| | | 30 | McCaslin Marsh | 520 | 24.0 | Tahuya River |
| | | 31 | Panther Lake | 497 | 103.6 | Panther Creek to Tahuya River |
| | | 32 | Mission Lake | 516 | 87.7 | Mission Creek to Hood Canal |
| | | 33 | Mission Pond | 580 | 4.0 | Bear Creek to Union River |
| | | 35 | Twin Lakes | 272 | 21.7 | No outlet, lies in Gorst Creek Drainage |
| T24N | R2W | 13 | Big Beef Ponds | 500 | 5.0 | Hood Canal |
| | | 14 | Unnamed Lake | 480 | 7.0 | Anderson Creek to Hood Canal |
| | | 23 | Hintzville Beaver Ponds | 540 | 3.0 | Stavis Creek to Stavis Bay |
| | | 23 | Unnamed Lake | 550 | 5.0 | Tahuya River |
| | | 26 | Morgan Marsh | 510 | 95.0 | Big Beef Creek & Hood Canal |
| | | 27 | Unnamed Lakes (1) | 550 | 2.2 | Hood Canal |
| | | | (2) | 550 | 1.9 | Hood Canal |
| | | 27 | Mulholland Marsh | 550 | 6.5 | Tahuya River |
| | | 31 | Ludvick Lake | 440 | 2.0 | Dewatto River |
| | | 34 | Intermittent Lake | 580 | 2.0 | Tahuya River |
| | | 34 | Unnamed Lake | 520 | 1.0 | Blacksmith Lake to Tahuya River |
| | | 35 | Unnamed Lake | 520 | 15.0 | Tahuya River |
| | | 36 | Spur 3 Pond | 500 | 1.0 | Tahuya River |
| T25N | R1W | 15 | Unnamed Lake | 10 | 1.4 | Hood Canal |
| | | 17 | Unnamed Lake | 15 | 1.0 | Hood Canal |
| | | 20 | Unnamed Lake | 10 | 3.5 | Seabeck Bay |
| | | 20 | Unnamed Lake | 10 | 1.4 | Seabeck Bay |
| | | 27 | Unnamed Lake | 430 | 1.0 | Big Beef Creek to Hood Canal |
| | | 30 | Unnamed Lake | 20 | 4.3 | Hood Canal |
| | | 33 | Sprague Pond | 440 | 2.3 | Big Beef Creek to Hood Canal |
| T22N | R1E | 10 | Intermittent Lake | 270 | 4.0 | Minter Creek to Carr Inlet |
| | | 10 | Horseshoe Lake | 270 | 40.3 | Bear Creek to Burley Creek |
| T22N | R2E | 5 | Mace Lake | 300 | 2.2 | Olalla Creek to Colvos Passage |
| T23N | R1E | 3 | Berry Lakes (1) | 200 | 0.3 | Blackjack Creek to Sinclair Inlet |
| | | | (2) | 200 | 3.3 | Blackjack Creek to Sinclair Inlet |
| | | 3 | Honey Lake | 240 | 1.0 | Blackjack Creek to Sinclair Inlet |
| | | 9 | North Lake | 390 | 6.5 | Ross Creek to Sinclair Inlet |
| | | 12 | Unnamed Lake | 280 | 1.0 | Sinclair Inlet |
| | | 14 | Deep Lake | 190 | 2.8 | Blackjack Creek to Sinclair Inlet |
| | | 16 | Square Lake | 400 | 7.9 | Square Creek to Sinclair Inlet |
| | | 17 | Nels Johnson Lake (1) | 430 | 4.0 | Sinclair Inlet |
| | | | (2) | 430 | 5.0 | Sinclair Inlet |
| | | 20 | Flora Lake | 450 | 6.5 | Sinclair Inlet |
| | | 21 | Mathews Lake | 410 | 3.1 | Sinclair Inlet |
| | | 27 | Wildwood Lake | 420 | 7.0 | Sinclair Inlet |

Table 50. EXISTING LAKES AND RESERVOIRS IN THE REPORT AREA.* (Continued)

| Township | Location Range | Section | Name | Approximate elevation above sea level in feet | Approximate area in acres | Drainage |
|---|---|---|---|---|---|---|
| KITSAP COUNTY (continued) | | | | | | |
| T23N | R1E | 29 | Wicks Lake | 430 | 9.0 | Huge Creek to Carr Inlet |
| | | 30 | Fairview Lake | 380 | 7.4 | Rocky Creek to Case Inlet |
| | | 30 | Hidden Lake | 380 | 1.0 | Rocky Creek & Case Inlet |
| | | 30 | Sailor Lake | 350 | 1.9 | Rocky Creek to Case Inlet |
| | | 31 | Intermittent Lake | 320 | 5.0 | Rocky Creek to Case Inlet |
| | | 31 | Helena Lake | 390 | 5.9 | Rocky Creek to Case Inlet |
| | | 31 | Skunk Lake | 410 | 7.0 | Rocky Creek to Case Inlet |
| T23N | R2E | 8 | Long Lake | 118 | 314.0 | Curley Creek to Yukon Harbor |
| | | 33 | Intermittent Lake | 340 | 1.0 | Olalla Creek & Colvos Passage |
| T24N | R1E | 1 | Unnamed Lake | 280 | 1.2 | Port Orchard & Sinclair Inlet |
| | | 1 | Clair Marsh (East Segment) | 280 | 10.2 | Lies in Unnamed Stream Drainage tributary to Port Washington Narrows |
| | | 2 | Clair Marsh (West Segment) | 280 | 12.7 | Lies in Unnamed Stream Drainage tributary to Port Washington Narrows |
| | | 5 | Buffington Pond | 50 | 1.0 | Chico Bay to Dyes Inlet |
| | | 8 | Puget Sound Navy Yard Lake | 140 | 3.0 | Dyes Inlet |
| | | 8 | Carter Pond | 230 | 0.6 | Kitsap Creek to Dyes Inlet |
| | | 8 | Kitsap Lake | 156 | 238.4 | Kitsap Creek to Dyes Inlet |
| | | 18 | Beaver Dam Lake | 450 | 4.9 | Dickerson Creek to Dyes Inlet |
| | | 19 | Heins Lake | 250 | 5.2 | Alexander Lake to Sinclair Inlet |
| | | 21 | Abandoned Reservoir | 260 | 2.0 | Sinclair Inlet |
| | | 21 | Bremerton Reservoir | 250 | 1.2 | Sinclair Inlet |
| | | 25 | Unnamed Lake | 15 | 2.4 | Sinclair Inlet |
| | | 27 | Unnamed Lake | 10 | 1.3 | Sinclair Inlet |
| | | 29 | Jarstad Lake | 290 | 2.0 | Gorst Creek to Sinclair Inlet |
| | | 30 | Alexander Lake | 238 | 19.5 | Heins Creek to Sinclair Inlet |
| | | 33 | Hunts Mill Pond | 5 | 2.0 | Sinclair Inlet |
| | | 34 | Unnamed Lake | 130 | 1.3 | Ross Creek to Sinclair Inlet |
| T24N | R2E | 3 | Unnamed Lake | 200 | 2.8 | Port Blakely Harbor |
| | | 11 | Unnamed Lake | 280 | 2.2 | Puget Sound |
| | | 12 | Unnamed Lake | 20 | 1.5 | Puget Sound |
| | | 21 | Unnamed Lake | 280 | 1.9 | Beaver Creek to Clam Bay |
| T25N | R1E | 3 | Island Lake | 217 | 42.7 | Barker Creek to Dyes Inlet |
| | | 13 | Unnamed Lake | 20 | 1.0 | Port Orchard |
| | | 23 | Glud Ponds | 45 | 1.0 | Steel Creek to Burke Bay |
| | | 25 | Unnamed Lake | 380 | 2.5 | Port Orchard, Puget Sound |
| T25N | R2E | 4 | Erickson Reservoir | 60 | 1.7 | Manzanita Bay, Port Orchard |
| | | 16 | Unnamed Reservoir | 240 | 2.0 | Puget Sound |
| | | 28 | Unnamed Reservoir | 140 | 1.8 | Fletcher Bay |
| | | 32 | Gazzam Lake | 300 | 12.7 | Port Orchard |
| T26N | R1E | 19 | Bangor Lake | 20 | 4.6 | Hood Canal |
| | | 36 | Keyport Lagoon | 0 | 22.4 | Port Orchard |
| T26N | R3E | 7 | Unnamed Lake | 10 | 3.5 | Puget Sound |
| | | 18 | Unnamed Lake | 10 | 3.0 | Puget Sound |
| T27N | R1E | 25 | Intermittent Lake | 410 | 16.0 | Hood Canal |
| T27N | R2E | 21 | Miller Lake | 50 | 25.7 | Port Gamble Harbor |
| | | 27 | Carpenter Lake | 30 | 3.4 | Appletree Cove |
| | | 33 | Niemeier Ponds | 50 | 1.0 | Miller Bay |
| T28N | R2E | 21 | Buck Lake | 140 | 19.8 | Puget Sound |
| MASON COUNTY | | | | | | |
| T22N | R2W | 6 | Howell Lake | 450 | 9.6 | Tahuya River |
| T22N | R3W | 3 | Cady Lake | 450 | 14.9 | Dewatto River & Hood Canal |
| | | 4 | "U" Lake | 520 | 16.2 | Hood Canal via Robbins Lake |
| | | 4 | Don Lake | 520 | 17.1 | Hood Canal |
| | | 4 | Lone Duck Pond | 550 | 3.5 | Hood Canal |
| | | 5 | Robbins Lake | 520 | 16.8 | Hood Canal |
| | | 11 | Unnamed Lake | 400 | 2.5 | Rendsland Creek to Hood Canal |
| | | 11 | Unnamed Lake | 360 | 1.5 | Rendsland Creek & Hood Canal |
| | | 11 | Unnamed Lake | 300 | 2.3 | Tahuya River |
| | | 11 | Nigger Slough | 400 | 16.0 | Rendsland Creek to Hood Canal |
| | | 14 | Maggie Lake | 400 | 22.3 | Tahuya River & Hood Canal |
| | | 14 | Dry Pond | 400 | 2.4 | Tahuya River |
| | | 15 | Grass Lake | 400 | 2.5 | Hood Canal |
| | | 15 | Jiggs Lake | 380 | 8.8 | Tahuya River |
| | | 16 | Wood Lake | 500 | 10.0 | Hood Canal |

Table 50. EXISTING LAKES AND RESERVOIRS IN THE REPORT AREA.* (Continued)

| Location Township | Range | Section | Name | Approximate elevation above sea level in feet | Approximate area in acres | Drainage |
|---|---|---|---|---|---|---|
| MASON COUNTY (continued) | | | | | | |
| T22N | R3W | 16 | Wildberry Lake | 500 | 8.1 | Lower Rendsland Creek & Hood Canal |
| | | 27 | Wheeler Lake | 350 | 8.0 | Hood Canal |
| T23N | R1W | 5 | Tiger Lake | 496 | 109.1 | Mission Creek to Hood Canal |
| | | 6 | Unnamed Lake | 450 | 7.4 | Mission Creek & Hood Canal |
| | | 30 | Larson Lake | 280 | 1.7 | Union River |
| T23N | R2W | 3 | Unnamed Lake | 440 | 1.0 | Tahuya River |
| | | 3 | Blacksmith Lake | 422 | 18.3 | Tahuya River |
| | | 4 | Erickson Lake | 475 | 15.2 | Dewatto River |
| | | 8 | Intermittent Lake | 370 | 4.6 | Dewatto River |
| | | 8 | Intermittent Lake | 370 | 6.8 | Dewatto River |
| | | 9 | Unnamed Lake | 410 | 1.5 | Tahuya River |
| | | 9 | Unnamed Lakes | 450 | 3.0 | Tahuya River |
| | | 10 | Unnamed Lake | 400 | 3.4 | Tahuya River |
| | | 14 | Camp Pond | 350 | 5.9 | Tahuya River |
| | | 14 | Suckell Pond | 400 | 14.0 | Long Marsh via Goat Ranch Lake & to Tahuya River |
| | | 15 | Oak Patch Lake | 319 | 6.2 | Tahuya River |
| | | 17 | Intermittent Lake | 430 | 2.5 | Tahuya River |
| | | 17 | Twin Lakes (Big Twin) | 395 | 15.2 | Little Twin & Tahuya River |
| | | 17 | (Little Twin) | 394 | 5.5 | Tahuya River |
| | | 19 | Wooten Lake | 407 | 69.8 | Haven Lake & Tahuya River |
| | | 20 | Bennettsen Lake | 381 | 25.4 | Tahuya River |
| | | 23 | Goat Ranch Lake | 340 | 20.0 | Tahuya River to Hood Canal |
| | | 26 | Long Marsh | | Dry in summer | Tahuya River to Hood Canal |
| | | 30 | Haven Lake | 366 | 70.5 | Tahuya River |
| | | 31 | Erdman Lake | 363 | 17.4 | Tahuya River |
| | | 31 | Collins Lake | 410 | 4.3 | Tahuya River |
| T23N | R3W | 12 | Unnamed Lake | 525 | 3.5 | Dewatto River & Hood Canal |
| | | 13 | Oak Lake | 190 | 15.0 | Dewatto River to Hood Canal |
| | | 25 | Larson Lake | 400 | 9.0 | Shoe Lake & Dewatto River to Hood Canal |
| | | 32 | Aldrich Lake | 520 | 9.8 | Hood Canal |
| | | 35 | Unnamed Lake | 420 | 2.0 | Dewatto River to Hood Canal |
| | | 35 | Tee Lake | 390 | 38.4 | Rendsland Creek to Hood Canal |
| | | 35 | Unnamed Lake | 400 | 3.0 | Rendsland Creek to Hood Canal |
| | | 36 | Shoe Lake | 380 | 6.0 | Dewatto River & Hood Canal |
| PIERCE COUNTY | | | | | | |
| T20N | R1W | 1 | Bay Lake | 27 | 129.6 | Mayo Cove, Carr Inlet |
| | | 5 | Unnamed Lake | 0 | 4.5 | Case Inlet |
| | | 10 | Palmer Lake | 170 | 8.5 | Case Inlet |
| | | 10 | Little Palmer Lake | 50 | 4.3 | Case Inlet |
| | | 22 | Gravel Pit Lake | 225 | | Case Inlet |
| | | 22 | Unnamed Lake | 225 | 14.9 | Case Inlet |
| | | 26 | Unnamed Lake | 120 | 1.0 | Taylor Bay, Nisqually Reach |
| T21N | R1W | 22 | Unnamed Reservoir | 10 | 6.8 | Case Inlet |
| | | 23 | Jackson Lake | 196 | 15.8 | Carr Inlet |
| | | 33 | Unnamed Lake | 140 | 1.2 | Case Inlet |
| | | 33 | Herron Lake | 182 | 9.9 | Case Inlet |
| T22N | R1W | 14 | Carney Lake | 350 | 39.2 | Rocky Creek to Case Inlet |
| T19N | R1E | 4 | Florence Lake | 197 | 66.5 | Josephine Lake & Nisqually Reach |
| | | 8 | Unnamed Lake | 20 | 0.9 | Ora Bay, Nisqually Reach |
| | | 8 | Anderson Island Pothole | 10 | 2.8 | Nisqually Reach |
| | | 9 | Josephine Lake | 196 | 72.5 | Nisqually Reach, Puget Sound |
| T20N | R1E | 17 | Floyd Cove Reservoir | 30 | 2.0 | Pitt Passage |
| | | 17 | Luhr Creek Reservoir | 20 | 0.7 | Luhr Creek to Pitt Passage |
| | | 20 | Eden Creek Reservoir | 40 | 10.0 | Eden Creek to Balch Passage |
| | | 21 | Butterworth Reservoir | 85 | 100.0 | Eden Creek to Balch Passage |
| | | 27 | Anderson Pond | 22 | 1.5 | Puget Sound |

Table 50. EXISTING LAKES AND RESERVOIRS IN THE REPORT AREA.* (Continued)

| Location Township | Range | Section | Name | Approximate elevation above sea level in feet | Approximate area in acres | Drainage |
|---|---|---|---|---|---|---|
| PIERCE COUNTY (Continued) | | | | | | |
| T21N | R1E | 3 | Unnamed Lake | 15 | 2.4 | Henderson Bay, Carr Inlet |
| | | 12 | Maloney Lake | 248 | 5.3 | Artondale Creek & Wollochet Bay, Hale Passage |
| T22N | R1E | 19 | Stansberry Lake | 238 | 18.6 | Carr Inlet |
| | | 19 | Doyle Pond | 230 | 10.2 | Carr Inlet |
| | | 32 | Intermittent Lake | 100 | 17.0 | Carr Inlet |
| T22N | R2E | 19 | Intermittent Lake | 280 | 1.9 | Henderson Bay, Carr Inlet |
| | | 20 | Crescent Lake | 166 | 46.8 | Crescent Creek to Gig Harbor |
| | | 30 | Unnamed Lake | 250 | 3.1 | McCormick Creek & Henderson Bay |
| | | 33 | Unnamed Lake | 320 | 2.8 | Colvos Passage |

* Tabulation includes unnamed lakes one acre or more in surface area and all known named lakes.

Above the level of mean high water, as shown on the U.S. Geological Survey 7½ minute quadrangle map of Belfair, Washington, the Union River and its tributaries drain an area of 23.4 square miles. Elevations in the basin range from sea level to 1760 feet at the summit of Gold Mountain. This mountain and nearby Green Mountain to the north are the highest land forms in the report area and have a distinct affect on the general precipitation pattern. The mean annual precipitation over the basin from 1946-60 was estimated to vary from about 80 inches in the area of these mountains to about 56 inches in the lower part of the basin (pl. 4).

Continuous streamflow records have been collected at two locations in the Union River system (table 10 and pl. 3). Gage No. 0630 near Bremerton was installed in 1946 and operated through the 1959 water year. Gage No. 0635 near Belfair has records extending from 1947 through 1959. The record of Gage No. 0630 is unaffected by upstream diversion, but since 1956 the flow has been regulated somewhat by the City of Bremerton's Casad Dam and reservoir. Immediately downstream from Gage No. 0630 the City of Bremerton diverts from three to four thousand acre-feet of water annually for its municipal water supply. This and many other small downstream diversions, primarily for irrigation and domestic supply, are reflected in the records of Gage No. 0635. The regulatory effect of Casad Dam also has influenced the flow pattern at this gage for the period 1956-59. The actual yield of the drainage area above Gage No. 0635 is, therefore, somewhat greater than that indicated by the available record. This was considered in the runoff analysis and partially accounts for the sizable difference between the adjusted measured mean annual runoff shown for Gage No. 0635 in table 47, and the estimated mean annual effective precipitation shown for the Union River at confluence number 0 in table 48.

The analysis indicated that the entire basin produced about 39 inches or 49,000 acre-feet of mean annual effective precipitation during the period 1946-60 (table 48 and pl. 4). If the original data are extrapolated further by means of annual runoff ratios to represent the period 1934-59, the potential mean annual yield of the basin would be about 37 inches or 46,400 acre-feet. The statistics listed in table 49 for the two gages on the Union River show a moderately low measured annual runoff variability, indicating that the yield is reasonably consistent and reliable. Coefficients of variation are somewhat higher for the downstream gage (0635), but this is probably due in part to the City of Bremerton's large annual diversion.

The streamflow regimen of the Union River during the low flow period is best exemplified by the discharge-duration hydrograph of Gage No. 0635 (fig. 75). If summer flows during the years 1948-55 are representative of long-term trends, the lowest flows can normally be expected during the last week of August and the first three weeks of September. For any specific day during the latter part of this period, the average discharge at this gage can be expected to be less than 14.5 cfs about 1 year out of every 100. For days during the middle of this period, 50 percent of the time the flow should be greater than 20 cfs and 50 percent of the time less than 20 cfs. During the first part of the period there is a 2 percent chance of a daily discharge being equal to or greater than 25 cfs. Similarly the probable expectancy of having a given flow at this gage on a certain day during the months June through October can also be found from this graph.

In general, the relatively flat, narrow band of curves for Gage No. 0635 in fig. 75 indicates that ground-water is the primary contributor to the flow of the Union River during the summer. The abrupt rise displayed by the upper two curves, however, shows that direct surface runoff becomes an important factor during September and October. Additional low-flow information on several tributaries and at other locations on the main stem is presented in figs. 31-38 and tables 10-13, 23-26 and 48.

Twin Lakes and Lider Lake are the only significant sources of natural surface storage within the Union River basin (table 50). The artificial reservoir behind Casad Dam, however, provides a total storage capacity of about 4000 acre-feet at its normal full operating level (fig. 83).

## MISSION CREEK

Mission Creek and its tributaries comprise the major drainage system lying adjacent to and west of the Union River Basin. The main stream has its source along the western base of Gold Mountain approximately 8 miles west of Bremerton and courses in a south-southwesterly direction for about 9 miles to its mouth near the head of Hood Canal. Mission Lake is also situated at the foot of Gold Mountain and its outlet discharges into the main stem from the east about a mile from the source of Mission Creek (confluence No. 7). About 6 miles farther downstream, the outlet stream from Tiger Lake contributes to the system. This 3-mile long tributary (confluence No. 3) is often dry in summer, especially in the marshy area along its upper reaches. A few other important tributaries drain small marshy areas located mainly in the western half of the basin.

The surface drainage area of Mission Creek basin, as measured above the mean high water level established by the U.S. Geological Survey, is 13.6 square miles. Elevations range from sea level to about 1680 feet on Gold Mountain. This orographic feature has a distinct effect on climate and, combined with an unobstructed southwest exposure to prevailing storms, causes, on an average, greater amounts of precipitation to occur in this part of Mission Creek basin than anywhere else in the report area. For the period 1946-60 the mean annual precipitation at these higher elevations was estimated to be over 80 inches while farther south in the lower part of the basin the lowest mean annual precipitation received was about 57 inches (pl. 4).

Continuous streamflow data are available for two locations on the main stem of Mission Creek (table 10 and pl. 3). The upper gage (No. 0645), installed in 1945 and operated for approximately 8½ years, was ideally situated to measure runoff from Gold Mountain. The lower gage (No. 0650), installed about the same time and operated for 7½ years, provides runoff information for roughly the upper third of the basin. No runoff data are available for the major remaining portion of the watershed so the yield and streamflow regimen are less certain in the lower reaches.

Based on the analysis for the period 1946-60, the entire Mission Creek watershed produced an average effective precipitation or potential runoff of 37 inches or 26,600 acre-feet annually (table 48 and pl. 4). If the Grapeview runoff ratios are used to adjust the data to the period 1934-59, the potential mean annual yield would be about 35 inches or 25,200 acre-feet. The coefficients of variation (table 49) for like periods of record at the two gages indicate that percentagewise variations in measured annual runoff are nearly identical at these locations and the dependability of the yield ranks about average among other major watersheds in the report area.

Low-flow discharge-duration hydrographs for the two gages show that summer flows are more variable at the upstream site than farther downstream (figs. 75 and 76). Ground-water discharge provides a greater percentage of the downstream flows, consequently low flows are somewhat more dependable in the lower reaches of this stream. If the data are representative of future conditions, the percent chance that a given mean discharge will occur on a certain day can be estimated from these graphs. For example, there is a 1 percent chance that the mean daily discharge on any September 20 will be less than 0.011 cfs, at the site of Gage No. 0650. These curves show that the lowest flows can be expected during the period from about August 25 to the end of September. Low-flow information is also provided for this stream system in figs. 39-46 and tables 10, 11, 14, 15, 27-30 and 48.

The major sources of natural surface water storage in the Mission Creek basin are Mission and Tiger Lakes. Smaller quantities are retained in Larson Lake, another small unnamed lake and several intermittent marsh areas (table 50).

## TAHUYA RIVER

The Tahuya River and its tributaries form the largest individual stream system in the report area. Originating in a swampy area on the west side of Green Mountain, approximately 9 miles west of Bremerton, the Tahuya River flows in a general southwesterly direction for about 20 miles and enters Hood Canal near the town of Tahuya. Gold Creek, one of the most important tributaries, joins the main river about a mile from its source (confluence No. 21). This rather short tributary begins in a swampy beaver-pond area between Green and Gold Mountains and flows approximately 2½ miles due west to its confluence with the river. Panther Lake, one of the larger lakes in the basin, discharges into the main stream by way of Panther Creek about 4 miles downstream from the source (confluence No. 19). Of the many small tributaries along the lower reaches of the Tahuya River, Little Tahuya Creek is probably the most important. This stream drains Lake Wooten, Haven Lake and Twin Lakes and joins the main stem of the Tahuya River about 12 miles from its source (confluence No. 12).

The Tahuya River basin ranges in elevation from sea level at the mouth of the river to about 1760 feet at the summit of Gold Mountain. The total surface area drained by the system is 45.1 square miles as fixed by the level of mean high water shown on the U.S. Geological Survey 15-minute quadrangle map of Potlatch, Washington.

Mean annual precipitation on the Tahuya River basin, as estimated for the years 1946-60, varies from a low of about 59 inches near Camp Pond to highs of around 80 inches near the summits of Green and Gold Mountains and nearly 70 inches in the extreme southwestern part of the watershed (pl. 4).

Continuous streamflow data have been collected at 5 different locations in the Tahuya River system (table 10 and pl. 3). Gage No. 0680 was located to measure runoff from nearly all of the basin; however, this gage was in operation for only 3½ months during the summer of 1947. The other gages, beginning with the year 1946, provide a minimum of 8 complete years of continuous record but only Gage No. 0655 on Gold Creek was still in operation at the time of this report. The Gold Creek gage has over 15 years of record representing the longest continuous source of streamflow data in the Kitsap Peninsula area. Considering the other 3 stations, Gage No. 0675 measured runoff from the upper third of the basin, Gage No. 0670 recorded the contribution of Panther Lake, and runoff from the mountainous area was measured by Gage No. 0660.

A study of daily discharges during extended dry periods shows that the Tahuya River becomes influent between Gages 0660 and 0675. That is, some of the flow seeps into the ground in this reach and adds to the immediate ground-water reservoir. Some of this water reappears at the surface to become streamflow farther downstream, but there is evidence to indicate that sizable quantities eventually discharge into the channels of other adjacent stream systems through ground-water migration. The high unit runoff of nearby Dewatto Creek implies that this system could be the recipient of some of this water.

Based on an analysis of available data, the potential mean annual yield of the entire Tahuya River basin during the period 1946-60 was estimated to be 42 inches or 104,400 acre-feet. If these figures are adjusted for the longer period, 1934-59, the potential mean annual yield would be about 40 inches or 98,900 acre-feet. An examination of the coefficients of variation in table 49 shows that measured annual runoff in the Tahuya River basin has been about as consistent as that of both Mission Creek and the Union River basins. Of the individually gaged areas within the Tahuya River system, annual runoff from Panther Creek basin displayed the least variability followed closely by runoff from the Gold Creek drainage. Except for the period 1946-50, records from gage 0660 on the main stem exhibited the largest coefficients of variation.

Summer-month discharge-duration hydrographs illustrating low-flow conditions in the Tahuya River basin are presented in figures 76, 77, 78 and 79. These graphs exhibit available data recorded at the 4 main gages and show that a variety of low-flow conditions exist within this basin.

The closely grouped family of curves obtained from the Gold Creek record (fig. 76), indicates that ground-water runoff is an important factor in maintaining low flows in this stream. If these curves are representative of long-term trends, the lowest flows each year can be expected to occur sometime during the period from about August 10 to the end of September. The 99 percent-of-time duration hydrograph essentially represents the lowest mean flow to be expected on any given day and, based on this curve, the mean-daily discharge at this station should seldom be much less than 0.32 cfs.

The expanded set of curves for Panther Creek (fig. 78) indicates there is little dependable base flow and summer streamflow can be expected to vary considerably from year to year. Panther Lake has a natural regulatory affect on the flow of Panther Creek and often during September the lake is lowered enough to cause the outlet stream to go completely dry. This is suggested by the pronounced dip in the discharge-duration hydrograph curves around September 10.

In comparing the discharge-duration hydrographs of Gages 0660 and 0675 on the main stem (figs. 77 and 79), it is evident that a sizable portion of the summer flow is lost in the course of travel between the two stations. It is unlikely that evaporation could account for all of this loss so it is logical to assume that the river is influent in this reach. The exact length of the influent reach is indeterminate from existing data, but the 1947 summer record of Gage No. 0680 shows that the river becomes effluent again in its lower reaches. As a result, low summer flows are reasonably reliable in the upper and lower reaches but drop off rapidly in the vicinity of Gage No. 0675 where, in fact, the stream is intermittent. Farther upstream near Gage No. 0660 late summer flows should seldom fall below 0.15 cfs.

In 1961 a dam was constructed on the Tahuya River between Gage No. 0660 and the confluence of Gold Creek. The project raised the level of Tahuya Lake from its original natural elevation of 582.5 feet to 590.1 feet, thus increasing the storage capacity from about 100 acre-feet to 1650 acre-feet (fig. 84). This increase in storage, together with changes in the hydraulic characteristics of the river has probably caused the above described flow regimen to be altered somewhat. Natural storage is also provided by the other large lakes previously mentioned and many smaller lakes, ponds and intermittent marshes (table 50).

## RENDSLAND CREEK

Rendsland Creek drains 8.74 square miles of the remote southwestern part of the Western Upland. From its source in Tee Lake, the stream courses southwesterly about $5\frac{1}{2}$ miles to a point on Hood Canal about 3 miles northwest of Tahuya. The highest points within this basin are found along the crest of the Hood Canal bluff which forms the western divide. Here elevations exceed 640 feet while farther inland the watershed divide is generally somewhat lower.

The extreme southwestern part of the Kitsap Peninsula receives the initial impact of storms passing through the gap between the Black Hills and the Olympic Mountains; consequently, mean annual precipitation is comparatively high in this area. An analysis of available data indicated that, during the 1946-60 period, the higher western parts of the Rendsland Creek basin probably received an average of over 70 inches a year while the headwater areas received a few inches less (pl. 4).

Continuous-record streamflow data is completely lacking in Rendsland Creek basin so the potential yield was evaluated with the aid of data collected in nearby areas. During the 15-year period, 1946-60, mean annual effective precipitation on this watershed was estimated to be about 47 inches or 21,800 acre-feet (table 48 and pl. 4). For the 1934-59 period the estimated potential yield was 45 inches or 20,700 acre-feet. Since annual climatic trends are quite uniform throughout the study area, annual runoff variability was probably similar to that of other nearby streams.

Though Rendsland Creek drains a sizable area, there apparently is little ground water held in storage to maintain flow throughout the summer. No information is available on upstream low flows, but two independent observations at the mouth showed the stream to be dry. This indicates a highly variable daily streamflow regimen supported primarily by direct surface runoff.

Natural surface storage in the Rendsland Creek basin occurs in Robbins Lake, U Lake, Nigger Slough and several other small lakes and swamps (table 50).

## DEWATTO CREEK

From its source about a mile southeast of Holly, the main channel of Dewatto Creek trends in a south-southwesterly direction paralleling Hood Canal for about 9 miles until it reaches Dewatto Bay. Excluding the area tributary to the tidal estuary, Dewatto Creek drains an area of 22.0 square miles. Like Rendsland Creek basin, the higher elevations are found along the western watershed divide. This divide lies at the crest of the bluff along Hood Canal and in places its elevations exceed 720 feet above mean sea level. Altitudes along the eastern divide generally average about 100 feet lower.

An analysis of data for the period 1946-60 indicated that mean annual precipitation on this basin varied from over 70 inches along the higher western border to less than 65 inches in the most easterly areas (pl. 4).

Gaging station No. 0685, located about two miles upstream from the mouth of Dewatto Creek, provides continuous-record streamflow data from mid 1947 through the 1954 water year and from mid 1958 through the cut-off date of this report (table 10 and pl. 3). These records accurately describe the natural flow regimen of Dewatto Creek since little diversion or regulation takes place above this site.

Based on studies of precipitation and evapotranspiration, the potential mean annual yield for this entire watershed during the period 1946-60 was 47 inches or 54,900 acre-feet (table 48 and pl. 4). If the longer period, 1934-59, is considered, the mean annual effective precipitation or potential yield would be about 45 inches or 52,000 acre-feet.

The above streamflow records adjusted to the 1946-60 period, however, gave a mean annual runoff at Gage No. 0685 of nearly 50 inches, thus indicating that measured runoff is greater than the potential runoff (table 47). The unequal size of the tributary drainage areas and inherent inadequacies of the basic data probably account for most of this difference, but there is evidence to indicate that some of the discrepancy could be attributed to inter-basin ground-water transfer. Though existing information affords no definite proof, it appears that ground waters originating in the adjacent Tahuya River basin could be contributing flow to the Dewatto Creek system through continuous aquifers which are not hydraulically controlled by surface topography.

The low annual-runoff coefficient of variation shown for Dewatto Creek in table 49 signifies that the yield of this stream is more consistent and dependable than other major drainages in the report area. It is possible that a runoff lag resulting from the large ground-water contribution to this stream system may have some influence in reducing the annual runoff variability.

The discharge-duration hydrograph of Dewatto Creek (fig. 77), with its closely grouped family of curves, further points out the dominent role of base flow in the regimen of this stream. These curves show that ground-water contributions, practically without exception, maintain a flow of over 10 cfs at Gage No. 0685 during the rain deficient summer months. Since a pattern of extended base-flow recession is apparent, it is difficult to specify a particular time when the lowest flows can be expected. The general trend, however, indicates that the minimum flow usually occurs sometime in August, September or early October. Percentagewise, the expected flow range for days in June, July and August is very low, implying that ground-water runoff is a major contributor during these months. The sudden rise of the low percent-duration curves in September and October, however, reflects an increase in direct surface runoff from fall rains.

The largest quantities of natural surface storage in the Dewatto Creek basin occur in Cady Lake, Shoe Lake, Larson Lake, Oak Lake and Erickson Lake (table 50). A few smaller lakes, ponds and marsh areas also prevail throughout the drainage area.

## THOMAS CREEK

As a consequence of the numerous steep bluffs along much of the Kitsap Peninsula's shoreline, drainage in the peripheral areas is characterized by many small, short streams and springs. Among these, Thomas Creek is outstanding because it displays an unusually high and constant discharge rate throughout the year.

Thomas Creek heads near the crest of the Hood Canal bluff just east of Holly and follows a precipitous north-northwesterly course to a small cove located about three-quarters of a mile below its source. The steep surface drainage area tributary to Thomas Creek occupies only 0.38 square mile, so direct runoff lasts for only a short period of time after each storm.

Miscellaneous measurements made during the normal dry season, however, show that the stream has a rather constant flow in excess of 2 cubic feet per second (table 11). While plate 4 shows a potential yield or mean annual effective precipitation for this area of only 46 inches, a constant minimum discharge rate of 2 cubic feet per second would produce at least 1450 acre-feet or 72 inches of runoff annually. The great discrepancy between potential and actual yield confirms the assumption that the flow of Thomas Creek is maintained largely by ground water that originates outside of the topographic boundaries of this watershed. The same type of phenomenon also occurs in many other small coastal drainages but the effect is usually not as pronounced.

## DOGFISH CREEK

Two major tributary branches characterize the drainage network of Dogfish Creek basin. The West Fork of Dogfish Creek, originating in a marshy area of Big Valley about 4 miles north of Poulsbo, follows the valley in a general southerly direction (confluence No. 3). The East Fork has its source in the Northern Upland about 2 miles northeast of Poulsbo and trends in a southwesterly direction toward Big Valley. Approximately a mile north of Poulsbo the two forks join to form the main stem which then continues southwesterly for about three-quarters of a mile to Liberty Bay. Altitudes in the basin range from sea level to over 480 feet, and the system drains a surface area of 7.63 square miles.

As a result of the Olympic Mountain rain-shadow effect, mean annual precipitation in the Dogfish Creek area was estimated to average only 37 inches during the 1946-60 period (pl. 4). Similarly, the potential yield or mean annual effective precipitation for this basin was estimated to be only 18 inches or 7200 acre-feet for the same 15-year period (table 48 and pl. 4) and 17 inches or 6800 acre-feet for the longer 1934-59 period. The record of Gage No. 0700 on the main stem, however, shows that the actual measured runoff was somewhat greater. Adjusting the 13 available years of record to be representative of the 1946-60 period, the area contributing above this gage was found to have produced a mean annual runoff of 24 inches (table 47). The inability of available basic data to accurately delineate actual conditions could be responsible for this large difference, but there is also evidence that the discrepancy can be partially attributed to an inflow of ground water from adjacent areas outside the basin. An exceptionally large contribution from springs in the Lofall-Poulsbo trough tends to bear out the latter possibility. Though its lower annual water production would imply higher variability, the coefficients of variation in table 49 show that, with the exception of Dewatto Creek, the annual yield of this stream has been more consistent than that of most other streams in the report area.

While most streams in the southern part of the area exhibit minimum flows toward the end of August or in September, the lowest flows in Dogfish Creek usually occur in late July or early August. This may in part be due to the difference in climate between the northern and southern areas, but the effect can more likely be attributed to large irrigation diversions and heavy withdrawals from certain springs by the City of Poulsbo water department.

A slow spring recession rate followed by a well-maintained summer base flow characterizes the discharge-duration hydrograph of Dogfish Creek (fig. 78). Generally, this family of curves shows only a slight vertical spread, so flow in Dogfish Creek has deviated little from its normal pattern from year to year during the indicated five-month period. However, during the extreme low-flow period, a radical dip occurred in the 99 percent hydrograph curve. This anomalous departure was probably produced by excessive diversion and doesn't necessarily represent the natural flow regimen of the stream. At times when water is being diverted, daily discharges as low as 1.0 cfs, can be expected at the gage, but under natural conditions, the flow should seldom be less than 2.5 cfs.

The watershed has no lakes but some surface storage is provided in the large marshy area near the source of the West Fork of Dogfish Creek.

## CHICO CREEK

Chico Creek and its four major tributaries drain a 16.0 square-mile area located a few miles northwest of Bremerton and immediately northeast of Green and Gold Mountains. Wildcat Creek, situated in the northwestern part of the basin, is the largest tributary and receives runoff from over one-third of the entire area. Originating at Wildcat Lake, this stream courses southeasterly for nearly 2 miles to its confluence with Lost Creek about 2 miles above tide water (confluence No. 6). The area immediately south of the Wildcat Creek watershed is drained by Lost Creek which heads approximately a mile east of Green Mountain and follows a general northeasterly course for about 3 miles to its confluence with Wildcat Creek. Below this point the main stream is referred to as Chico Creek. Dickenson Creek flows into Chico Creek (confluence No. 2) from the south about a mile downstream from the Wildcat-Lost Creek confluence. The discharge from Kitsap Creek, also from the south, enters the main channel of Chico Creek a short distance below Dickenson Creek (confluence No. 1).

Since the basin partially encompasses the northeastern slopes of Green Mountain, it has altitudes as high as 1560 feet above mean sea level. Precipitation received in these upper areas is comparable to that near the summits of Green and Gold Mountains, but the existence of these mountains tends to shelter the remaining part of the basin from prevailing storms and greatly reduces precipitation at lower levels. From an analysis of 1946-60 data, mean annual precipitation was estimated to vary from about 75 inches at the highest elevations to approximately 48 inches in the lower northeasterly areas (pl. 4).

Continuous streamflow records were obtained at gage No. 0720 from mid 1947 through the 1950 water year (table 10 and pl. 3). These data, adjusted to the 1946-60 period, indicated a mean annual runoff of 33 inches for Chico Creek basin (table 47). This differs only slightly from the estimated mean potential yield for the same period of 35 inches or 30,200 acre-feet per year (table 48 and pl. 4). The mean annual effective precipitation for the 1934-59 period was estimated to be about 33 inches or 28,600 acre-feet. Such a small discrepancy can probably be attributed to inherent inadequacies in the existing data although it is possible that some ground water is lost from the Chico Creek area to several nearby small streams tributary to Chico Bay.

Since large portions of Chico Creek basin are geologically and topographically unsuited for storing appreciable amounts of ground water, the streams in this drainage system tend to recede rapidly after a storm, and little water is retained to maintain base flow during dry periods. The 1950 water-year hydrograph at gage No. 0720 (fig. 27) illustrates the general low-flow tendency of Chico Creek and shows that there is a high probability that the stream will go completely dry during the months of August, September or October. Miscellaneous measurements in table 11 imply similar low-flow trends on the tributary streams. In addition to the surface storage in Wildcat and Kitsap Lakes, some storage exists in the Dickenson Creek drainage in Beaver Dam Lake and in several marshes in the northern part of the Chico Creek basin (table 50).

## GORST CREEK

Gorst Creek drains a 9.08 square-mile area located at the northeast end of the Union River-Gorst Creek Valleys. Having its source near the community of Sunnyslope, the main stream initially follows a north-northwesterly course toward the Old Navy Yard Highway. After crossing the highway, the course gradually changes toward the east, paralleling the highway, until it reaches the western end of Sinclair Inlet. Parish Creek (confluence No. 3) and Heins Creek (confluence No. 4), the two major tributaries, join the main stem immediately west of Gorst.

The southeastern extension of the Gold Mountain upland is the highest area in the basin. This area, with altitudes in excess of 1300 feet, receives an average of as much as 70 inches of precipitation annually, while the lowest parts of the watershed receive only about 50 inches (pl. 4).

Streamflow data in this basin consist of a few miscellaneous measurements on the main stem and major tributaries (table 11). Mean annual potential runoff was therefore estimated by correlation of continuous record streamflow data from nearby basins with precipitation and evapotranspiration data. This analysis indicated that the Gorst Creek watershed should have produced a mean annual effective precipitation during the 1946-60 period of about 37 inches or 18,000 acre-feet (35 inches or 17,100 acre-feet for the 1934-59 period). Since the City of Bremerton diverts water from Gorst Creek for its municipal system, the remaining usable supply could be somewhat less than indicated by these figures.

Though corroborating data are lacking, low-flow measurements indicate that a sizable base flow is maintained in Gorst Creek during summer months. Such a condition would produce a relatively uniform flow pattern with moderately low daily variability, making this stream system a dependable source of supply.

A small amount of natural surface storage is provided by Heins, Alexander and Jarstad Lakes (table 50).

## BLACKJACK CREEK

Lying immediately south of Port Orchard, the 12.4 square-mile area drained by Blackjack Creek displays the characteristic low-relief glacial topography found throughout most of the Kitsap Peninsula. Altitudes range from sea level to about 520 feet at the divide near Square and Matthews Lakes and from this area the main drainage follows a general northeasterly course for approximately 6 miles to Sinclair Inlet at Port Orchard.

The regional analysis of data for the period 1946-60 indicated a range in mean annual precipitation in this basin from about 48 inches in the north to about 55 inches in the south (pl. 4). The mean annual effective precipitation or potential yield of the area (table 48 and pl. 4) was estimated to be 30 inches or 19,600 acre-feet for the 1946-60 period (28 inches or 18,600 acre-feet for the 1934-59 period). However, three years of streamflow data from Gage No. 0725, adjusted to the same period, indicated a mean annual runoff of only 24 inches (table 47). This difference implies either inadequate data or a loss of ground water to adjacent drainages.

Although there are numerous water rights to divert the flow of Blackjack Creek, ground-water discharge into the stream system is generally sufficient to maintain a reasonably high base flow. The minimum recorded instantaneous flow at Gage No. 0725 was 6.7 cfs (table 10), and the 1950 water-year hydrograph (fig. 28) illustrates the usual flow trend.

Several small lakes, including Deep Lake, Berry Lake, Square Lake and Matthews Lake, provide surface storage within the basin (table 50).

## BURLEY CREEK

Burley Creek heads about a mile west of Long Lake and follows a southerly course for approximately 5 miles to Burley Lagoon at the end of Henderson Bay. In general, the stream basin occupies the southern half of the Burley Creek-Blackjack Creek Valley. Elevations in this 10.8 square-mile basin are generally low and range from sea level to slightly above 460 feet.

Data obtained during the period 1946-60 show that there is a gradient in the mean annual precipitation over this area ranging from about 50 inches in the east to 54 inches in the west (pl. 4). As an average for the basin, mean annual effective precipitation was estimated to be 30 inches or 17,400 acre-feet during the same period (table 48 and pl. 4), and 28 inches or 16,500 acre-feet for the 1934-59 period. Adjusted streamflow records obtained at Gage No. 0730, however, indicate a mean annual runoff for the 1946-60 period of nearly 34 inches (table 47). Like other drainages in the report area where potential runoff is less than actual, Burley Creek displays an exceptionally high base flow implying that some of the ground-water contribution is derived from precipitation originally collected in adjacent watersheds.

The large ground-water contribution suggests low variability and a rather consistent flow pattern during summer months. Since the base flow is quite uniform and recedes at a slow rate (fig. 28), the lowest flows may occur anytime from June through October, though the probability for an annual minimum is greater during August, September or early October. Based on past records, the annual minimum daily discharge at Gage No. 0730 should average about 14 cfs, and should seldom be less than 10 cfs. Low-flow data for this stream and some of its tributaries are listed in tables 10 and 11.

Surface water storage in Burley Creek basin is limited to Horseshoe Lake and a few intermittent ponds (table 50).

## MINTER CREEK

Minter Creek and Huge Creek, its major tributary, drain a 15.9 square-mile area located a few miles west of Burley. Both streams follow converging southerly courses to their confluence near the south end of the basin (confluence No. 4). From this point the main stem continues southward for approximately a mile to its mouth at the head of Minter Bay.

Within the basin elevations range from sea level to somewhat more than 520 feet, and no outstanding topographic features are exhibited to modify precipitation. There is, however, a general decreasing gradient from north to south, and for the 1946-60 period, mean annual precipitation was estimated to range from 53 inches to 57 inches (pl. 4).

While little information, other than a few miscellaneous measurements, is available for Minter Creek proper, continuous streamflow records have been collected at Gage No. 0735 on Huge Creek since mid-1947 (tables 10 and 11, pl. 3). These records, adjusted to the 1946-60 period, showed a mean annual runoff of about 25 inches for this part of the watershed (table 47). In contrast to this, potential yield studies for the same period (table 48 and pl. 4), indicated that the area should have produced 32 inches or 11,300 acre-feet (30 inches or 10,700 acre-feet for the 1934-59 period). Again inter-basin ground-water transfer is implied, though it is not certain whether the water reappears as runoff in other parts of Minter Creek basin or is actually lost to adjacent drainages. Considering the entire Minter Creek basin, mean annual effective precipitation was estimated to be 32 inches or 27,000 acre-feet for the 1946-60 period.

It is interesting to note that, of the streams with five or more years of record, the annual runoff of Huge Creek produced the highest coefficients of variation (table 49). Such a degree of variability, however, is not excessively high when compared with yields of streams in more arid regions.

Tributaries in the northern part of the basin are mostly intermittent, but farther south increasing ground-water discharge maintains relatively uniform perennial base flows. The latter condition is apparent in the lower reaches of Huge Creek by the general shape of its discharge-duration hydrograph (fig. 79). The flatness of these curves shows a nearly constant discharge during the indicated months while the extremely narrow spread implies a low percentage variation in the summer flow pattern from year to year. The lowest flows, which have seldom been less than 3.5 cfs, have the greatest chance of occurring around the end of August but could appear almost any time during the period shown.

Lake Flora, Wicks Lake and several small marsh areas provide some surface water storage in the Minter Creek watershed (table 50).

## FLOODS IN THE REPORT AREA

By E. G. Bailey, U.S. Geological Survey

A flood is defined as a condition that prevails when the waters of a stream exceed the capacity of its normal channel and overflow the adjacent flood plains. In the area of this report, floods occur only during the fall, winter, and early spring seasons and result primarily from rainfall. During the flood season the highest discharges are most prevalent from November to February.

There is little recorded information in the area on the destructive effect of floods in relation to loss of property or human life. The streams are relatively small and flood damage has been confined largely to culverts, small bridges and other man-made channel structures. However, flood potential is always a factor of concern and it is desirable to appraise the flood threat to the extent that available knowledge will permit.

The highest momentary peak discharge in a water year is used as the significant flood for analysis in this report, although not every yearly peak discharge is of flood proportion. Also, such use of the annual flood does not imply that there may be only one flood of major importance each year; other peak flows occurring within the same water year sometimes have but slightly less magnitude than the annual flood. The annual maximum discharges of three streams in the Kitsap Peninsula area are shown in table 51. These data were collected at gaging stations that were operated on a year-around basis. The data are presented also in graphical form in figure 80 which illustrates the variations in annual peak discharges that may be expected.

### MAGNITUDE AND FREQUENCY OF FLOODFLOWS

The magnitude and frequency of recurrence of floodflows at the designated gaging points, also have been estimated for these three streams. The method of analysis is the same as used by the U.S. Geological Survey in other areas (Dalrymple, 1960). The conclusions drawn from the analyses are derived from the rather limited amount of available streamflow data, which were adjusted for frequency calculation purposes to those collected at other gaging stations in the general area during the 46-year period 1912-57. The flood-frequency data are presented by graphs in figures 81 and 82; these data are shown also in table 52. In figure 81 the graph sets forth the average recurrence interval at which a flood of given magnitude may be equaled or exceeded. For example, the Dewatto Creek near Dewatto flood of November 3, 1955, which had a peak discharge of 2,110 cubic feet per second, can be expected to be equaled or exceeded on an average of once in about 25 years. In figure 82, the flood-frequency data presented in figure 81 have been converted to probability of occurrence. Instead of showing the magnitude of a flood in terms of average recurrence interval, it is shown in chance of occurrence in any one year. For example, the graph in figure 82, for Dewatto Creek near Dewatto, shows that the flood of November 1955 has a chance of about 4 percent of occurring in any one year.

Estimates of flood frequency are based on the assumption that events of the future will have the same average frequency as events that were experienced in the past. It is well to note, however, that although the probable average frequency of a flood of given size can be estimated, the time (year) of its next occurrence cannot be predicted. For example, a flood of 50-year magnitude may be expected to occur twice in 100 years, but it is possible for two such floods to occur in consecutive years or in the same year. Therefore, flood-frequency data can be used as a guide in the design of flood-control projects such as dikes, levees, and storage dams, and in the design of bridge and culvert openings, but cannot be used to forecast the time when a flood will occur.

## WATER DEVELOPMENT SITES

The greatest need for water development in the report area lies in providing adequate storage for domestic and irrigation use in both rural and municipal areas during the summer deficit period. A steadily increasing population influx, resulting primarily from the recreational attractiveness of this area, has recently generated a corresponding increase in water demand. In certain critical areas most of the readily accessible supplies have been appropriated and, if the general trend continues, it will soon be necessary to find and develop more remote sources. The problem is further aggravated by a seasonal population fluctuation. Many people seeking recreation visit the area only during the summer months, thereby increasing the demand for domestic water when the supply is at a minimum.

Table 51. MOMENTARY ANNUAL MAXIMUM DISCHARGE, IN CUBIC FEET PER SECOND, OF UNION RIVER NEAR BELFAIR (0635), TAHUYA RIVER NEAR BELFAIR (0675), AND DEWATTO CREEK NEAR DEWATTO (0685).

| UNION RIVER NEAR BELFAIR | | | TAHUYA RIVER NEAR BELFAIR | | | DEWATTO CREEK NEAR DEWATTO | | |
|---|---|---|---|---|---|---|---|---|
| Water year | Discharge (cfs) | Date | Water year | Discharge (cfs) | Date | Water year | Discharge (cfs) | Date |
| 1946 | - | - | 1946 | 428 | Apr. 11, 1946 | 1946 | - | - |
| 1947 | - | - | 1947 | 622 | Feb. 14, 1947 | 1947 | - | - |
| 1948 | 1,090 | Oct. 19, 1947 | 1948 | 544 | Oct. 19, 1947 | 1948 | 660 | Oct. 19, 1947 |
| 1949 | 1,610 | Feb. 22, 1949 | 1949 | 900 | Feb. 22, 1949 | 1949 | 1,430 | Feb. 22, 1949 |
| 1950 | 1,160 | Jan. 21, 1950 | 1950 | - | - | 1950 | 1,630 | Nov. 27, 1949 |
| 1951 | 1,230 | Feb. 9, 1951 | 1951 | 780 | Feb. 9, 1951 | 1951 | 1,160 | Feb. 9, 1951 |
| 1952 | 616 | Jan. 30, 1952 | 1952 | 642 | Jan. 30, 1952 | 1952 | 968 | Jan. 30, 1952 |
| 1953 | 702 | Jan. 3, 1953 | 1953 | 616 | Jan. 8, 1953 | 1953 | 680 | Jan. 3, 1953 |
| 1954 | 834 | Jan. 5, 1954 | 1954 | 845 | Jan. 5, 1954 | 1954 | 1,280 | Jan. 5, 1954 |
| 1955 | 665 | Nov. 19, 1954 | 1955 | 794 | Nov. 19, 1954 | 1955 | - | - |
| 1956 | 1,040 | Nov. 3, 1955 | 1956 | 1,210 | Nov. 3, 1955 | 1956 | 2,110 | Nov. 3, 1955 |
| 1957 | 788 | Dec. 9, 1956 | 1957 | - | - | 1957 | - | - |
| 1958 | 340 | Dec. 25, 1957 | 1958 | - | - | 1958 | - | - |
| 1959 | 499 | Apr. 30, 1959 | 1959 | - | - | 1959 | 650 | Jan. 24, 1959 |
| 1960 | - | - | 1960 | - | - | 1960 | 1,060 | Nov. 20, 1959 |

Figure 80. ANNUAL MAXIMUM DISCHARGE OF UNION RIVER NEAR BELFAIR (0635), TAHUYA RIVER NEAR BELFAIR (0675), AND DEWATTO CREEK NEAR DEWATTO (0685).

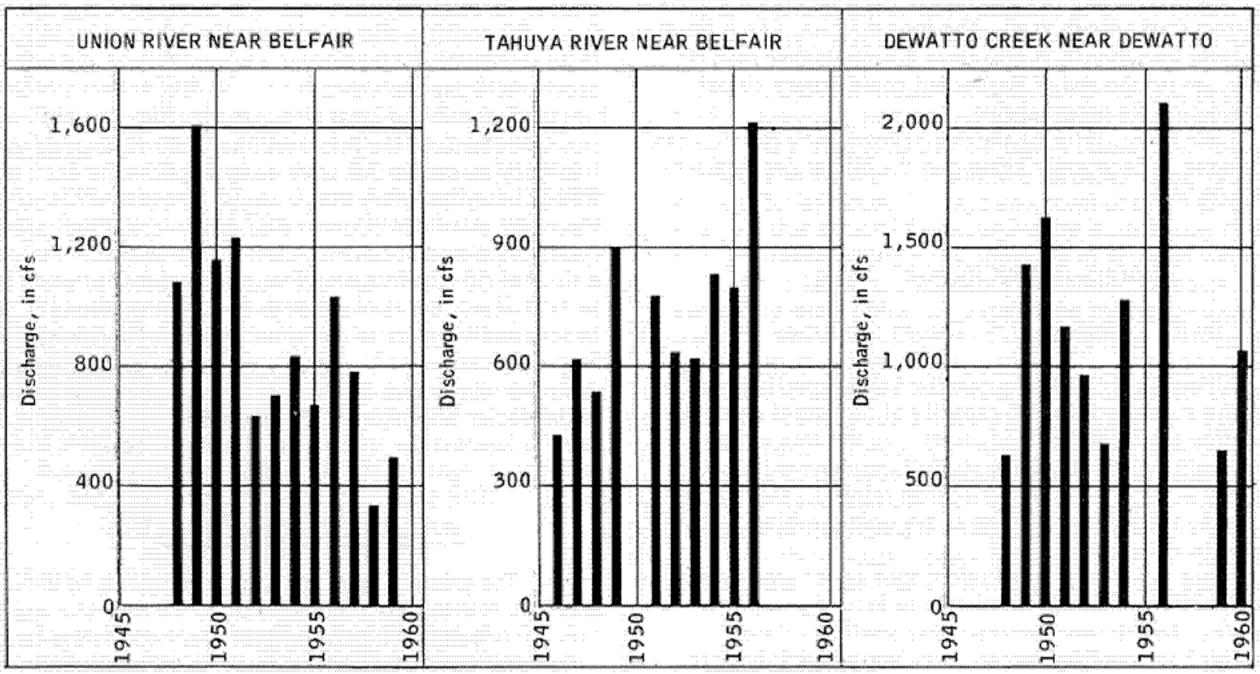


Figure 81. MAGNITUDE AND RECURRENCE INTERVAL OF ANNUAL FLOODS; UNION RIVER NEAR BELFAIR (0635), TAHUYA RIVER NEAR BELFAIR (0675), AND DEWATTO CREEK NEAR DEWATTO (0685).

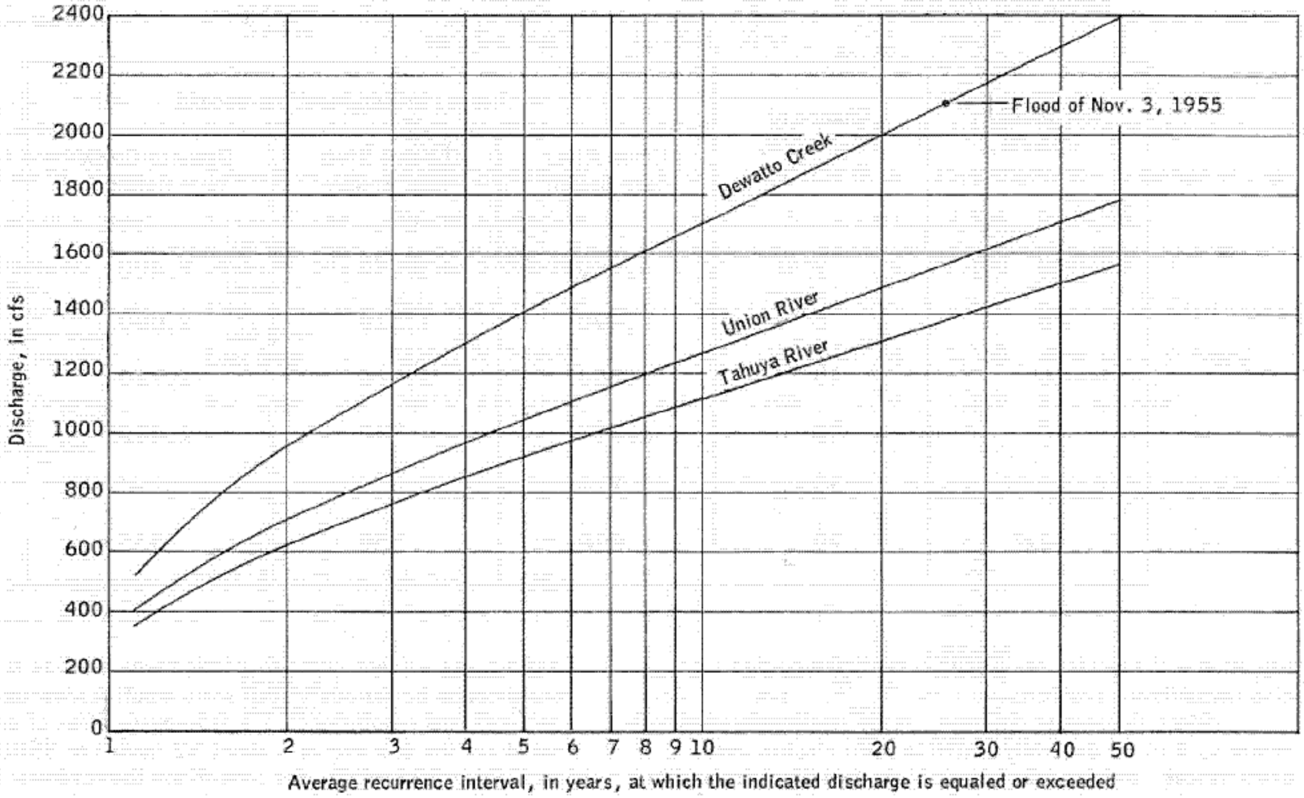



Figure 82. MAGNITUDE AND PERCENT CHANCE OF ANNUAL FLOODS; UNION RIVER NEAR BELFAIR (0635), TAHUYA RIVER NEAR BELFAIR (0675), AND DEWATTO CREEK NEAR DEWATTO (0685).

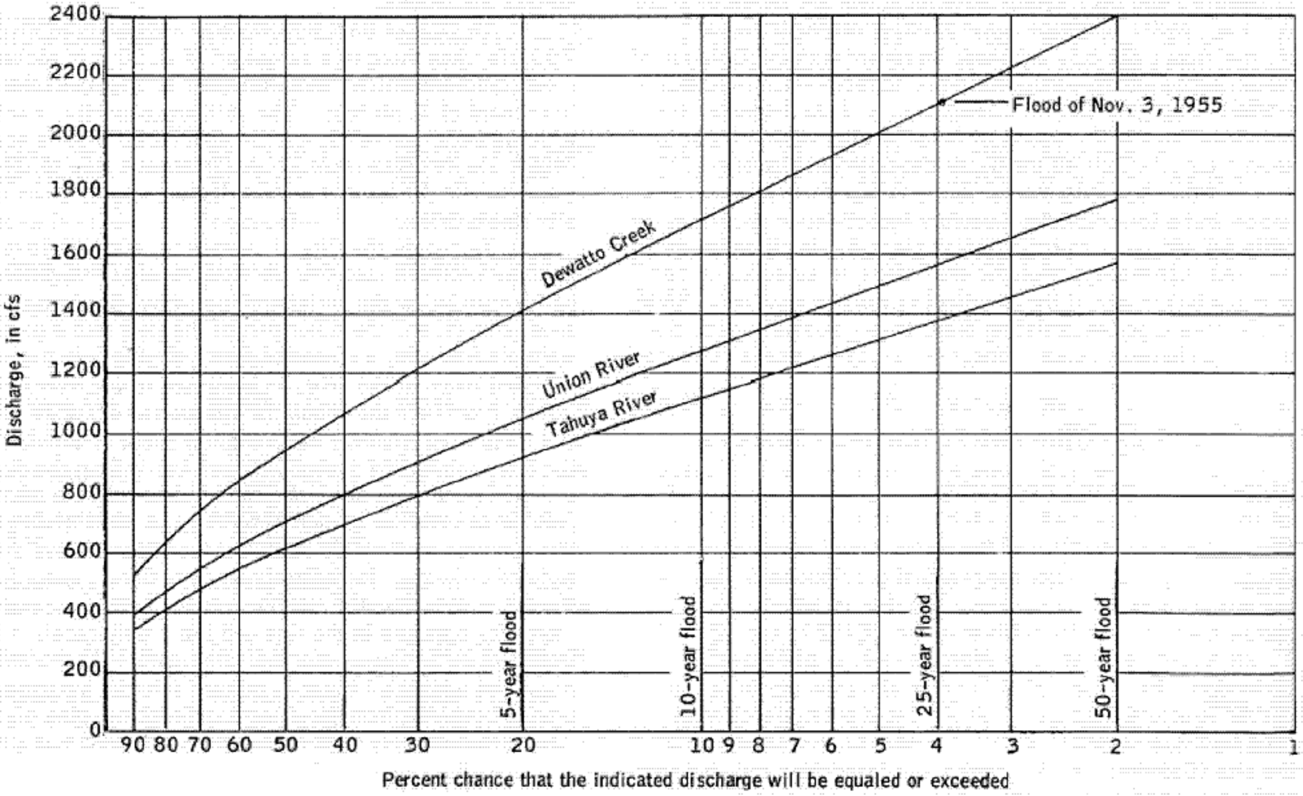


Table 52. AVERAGE RECURRENCE INTERVAL AND PERCENT CHANCE THAT SPECIFIC DISCHARGES WILL BE EQUALED OR EXCEEDED FOR UNION RIVER NEAR BELFAIR (0635), TAHUYA RIVER NEAR BELFAIR (0675), AND DEWATTO CREEK NEAR DEWATTO (0685).

| Recurrence interval, in years | Chance of recurrence, in percent | Discharge, in cubic feet per second | | |
|---|---|---|---|---|
| | | Union River near Belfair | Tahuya River near Belfair | Dewatto Creek near Dewatto |
| 50 | 2 | 1,780 | 1,570 | 2,400 |
| 20 | 5 | 1,490 | 1,310 | 2,000 |
| 10 | 10 | 1,280 | 1,120 | 1,720 |
| 5 | 20 | 1,040 | 920 | 1,400 |
| 2 | 50 | 710 | 625 | 955 |
| 1.1 | 90 | 400 | 350 | 535 |

Irrigation withdrawals, occurring primarily during this time, also intensify the problem.

Since the area is drained by many small separate stream systems, it is not generally suited to hydroelectric power development. In the past, however, small water wheels were operated at various locations to provide power for sawmill operations.

All major existing water development projects are listed in table 53 and their approximate locations are shown on plate 5. Farm ponds and other minor existing reservoirs were omitted from table 53, but those on record with the Division of Water Resources are included in the surface-water-right tabulation in Appendix D. No attempt was made to determine the individual size and capacity of these smaller reservoirs or to show their locations on the water-development site map.

Other possible storage sites of significance which appear to be feasible from a cursory investigation are listed in table 54 and are also indicated on plate 5. In all cases a detailed engineering, geologic and economic study would be required before any of these projects could be justified. Some of the more important existing projects and possible sites are discussed below.

## MAJOR EXISTING AND POTENTIAL PROJECTS

### UNION RIVER DEVELOPMENTS

In 1955 the City of Bremerton began construction on Casad Dam to store water for eventual distribution in its municipal water supply system. The dam is situated in a narrow gorge of the Union River in the SE¼SE¼, sec. 27, T. 24 N., R. 1 W.W.M., approximately 6 miles west of Bremerton. From the bed of the river the concrete-arch cantilever structure rises over 130 feet to a crest elevation of 644 feet (Cunningham, 1955). Geologic investigations at the site (Coombs, 1955) showed that foundation and abutment rocks consisted of a variety of basalts and some white felsite. Faulting was evident in the foundation area but was not considered to be serious though some grouting was necessary.

Annual runoff from the 3.05 square miles of drainage area above the dam averages about 52 inches or 8500 acre-feet (1946-60 period). By comparison the reservoir holds about half this amount at its normal operating elevation of 640 feet (1,300,000 gallons or 4000 acre-feet). Figure 83 shows the reservoir area and capacity at all possible water surface elevations.

The Casad Dam spillway has a capacity to discharge 700 cfs when there is a surcharge of 2.50 feet above the normal pool elevation. With the pool at this level there is a free-board of 1.50 feet. The spillway capacity, combined with the outlet valve capacity of about 120 cfs, is nearly double the maximum recorded instantaneous flow of the river at Gage No. 0630 located a short distance downstream from the site (table 10).

To supply the City of Bremerton, water is first released from the reservoir outlet to the river channel. Approximately half a mile below the outlet and just above McKenna Falls, a small dam diverts the major part of the flow into a pipeline. To maintain fish life, a continual flow, varying from 1 to 3 cfs at different times of the year, is bypassed to the river below the falls. From here the supply is transported eastward along the Old Navy Yard Highway and the north shore of Sinclair Inlet to the city distribution system. About a mile from the diversion a short lateral pipe connects Twin Lakes with the main line to provide an overflow storage reservoir. A short distance below this junction preliminary treatment facilities remove sediment and add chlorine. Immediately north of Gorst, water from Gorst Creek is diverted into the system. Here a pumping plant increases pressure in the line and the supply receives further treatment by an ammoniator and chlorinator. Half a mile below this point additional water is pumped into the system at certain times of the year from the Anderson Creek pumping plant located immediately west of Port Orchard.

Table 53. EXISTING MAJOR WATER DEVELOPMENT PROJECTS IN THE REPORT AREA.

| Name (owner) | Stream or drainage | Approximate dam location Sec. Twp. Rge | Storage capacity Acre-feet | Inundated area Acres | Tributary drainage area Sq. Mi. | Estimated potential mean annual run-off Acre-feet | Remarks |
|---|---|---|---|---|---|---|---|
| Union River Reservoir (City of Bremerton) | Union River | SE¼SE¼ 27-24N-1W | 4,000 | 91 | 3.05 | 8,500 | City of Bremerton water supply |
| Tahuya Lake (W. Hobson) | Tahuya River | SE¼NW¼ 20-24N-1W | 1,650 | 160 | 5.76 | 15,400 | Recreation and land development |
| Bangor Lake (U.S. Navy) | Stream No. 134 | NW¼NW¼ 19-26N-1E | 50* | 5 | 2.07 | 2,500 | Recreation |
| Unnamed Reservoir (U.S. Navy) | Unnamed Stream No. 141 | SW¼SW¼ 5-26N-1E | 70* | 10* | 1.90 | 2,100 | Recreation |
| Unnamed Reservoir (City of Bremerton) | Unnamed Wright (Charleston) Creek | SE¼SW¼ 21-24N-1E | 15* | 2 | 0.41 | 700 | Bremerton water system |
| Eden Creek Reservoir | Eden Creek | SE¼SE¼ 20-20N-1E | 80* | 10 | 0.98 | 1,400 | Water supply for Federal penitentiary |
| Butterworth Reservoir | Eden Creek | NW¼SW¼ 21-20N-1E | 2,000* | 100 | 0.90 | 1,300 | Same as above |

*Estimated.

Table 54. POTENTIAL STORAGE SITES IN THE REPORT AREA.

| Name (owner) | Stream or drainage | Approximate dam location Sec. Twp. Rge | Storage capacity Acre-feet | Inundated area Acres | Tributary drainage area Sq. Mi. | Estimated potential mean annual run-off Acre-feet | Remarks |
|---|---|---|---|---|---|---|---|
| KITSAP PENINSULA | | | | | | | |
| Upper Mission Creek Site | Mission Creek | NE¼NE¼ 25-23N-2W | 1,200 | 50 | 11.42 | 22,600 | Water supply for north shore Hood Canal, east end. |
| Lower Mission Creek Site | Mission Creek | SE¼NE¼ 25-23N-2W | 9,500 | 220 | 12.04 | 23,800 | Same as above. |
| Little Mission Creek Site | Little Mission Creek | SW¼SW¼ 36-23N-2W | 1,600 | 30 | 1.72 | 3,300 | Water supply for north shore Hood Canal area. |
| Stimson Creek Site | Stimson Creek | NW¼SE¼ 3-22N-2W | 5,100 | 85 | 1.72 | 3,500 | Same as above. Suitable for partial or complete development. |
| Shoofly Creek Site | Shoofly Creek | NW¼SW¼ 18-22N-2W | 2,000 | 30 | 0.85 | 1,900 | Same as above. |
| Gold Creek Site | Gold Creek | NW¼SE¼ 21-24N-1W | 2,700 | 100 | 1.36 | 3,900 | Water supply for area west of Bremerton. |
| Tahuya River Diversion | Tahuya River | SW¼ 20-24N-1W | Diversion structure | | 5.8± | 15,400 | Bremerton water system. |
| Mission Creek Diversion | Mission Creek | NE¼NW¼ 32-24N-1W | Diversion structure | | 1.8± | 4,900 | Bremerton water system. |
| Small Lower Tahuya River Site | Tahuya River | NW¼SW¼ 5-22N-2W | 11,100 | 340 | 37.70 | 84,000 | Water supply for Tahuya Peninsula and recreation. |
| Large Lower Tahuya River Site | Tahuya River | SW¼ 12-22N-3W | 111,700 | 1,620 | 42.21 | 94,300 | Same as above. |
| Rendsland Creek Site | Rendsland Creek | SW¼NE¼ 17-22N-3W | 10,200 | 225 | 7.39 | 18,400 | Water supply for Great Bend area, east shore Hood Canal and recreation. |
| North Branch Anderson Creek Site | North Branch Anderson Creek | NE¼NE¼ 21-24N-2W | 2,700 | 60 | 1.68 | 3,800 | No specific use at present. |
| South Branch Anderson Creek Site | South Branch Anderson Creek | Center 21-24N-2W | 5,500 | 95 | 2.03 | 4,800 | Same as above. Suitable for partial or complete development. |
| Harding Creek Site | Harding Creek | SW¼SW¼ 9-24N-2W | 2,600 | 50 | 1.27 | 2,900 | Water supply and/or power. |
| East Branch Stavis Creek Site | Stavis Creek | NW¼SE¼ 36-25N-2W | 6,200 | 110 | 3.28 | 7,000 | No specific use at present. |
| West Branch Stavis Creek Site | Stavis Creek | SE¼SE¼ 35-25N-2W | 1,700 | 40 | 1.71 | 3,600 | Same as above. |
| Seabeck Creek Site | Seabeck Creek | NE¼NE¼ 31-25N-1W | 1,800 | 40 | 2.30 | 4,400 | Water supply for Seabeck area. |
| Upper Big Beef Creek Site | Big Beef Creek | SE¼NE¼ 5-24N-1W | 800 | 80 | 7.62 | 16,700 | Recreation. |
| Middle Big Beef Creek Site | Big Beef Creek | NE¼SW¼ 34-25N-1W | 5,400 | 110 | 11.54 | 24,600 | Suitable for partial or complete development. |

Table 54. POTENTIAL STORAGE SITES IN THE REPORT AREA. (continued)

| Name (owner) | Stream or drainage | Approximate dam location Sec. Twp. Rge | Storage capacity Acre-feet | Inundated area Acres | Tributary drainage area Sq. Mi. | Estimated potential mean annual run-off Acre-feet | Remarks |
|---|---|---|---|---|---|---|---|
| KITSAP PENINSULA (continued) | | | | | | | |
| Lower Big Beef Creek Site | Big Beef Creek | SE¼SW¼ 22-25N-1W | 6,900 | 150 | 13.30 | 27,700 | Suitable for partial or complete development. Water supply. |
| Anderson Creek Site | Anderson Creek | SW¼SW¼ 13-25N-1W | 2,600 | 50 | 3.38 | 5,000 | Same as above. |
| Jump-off Creek Site | Jump-off Creek | SW¼SE¼ 27-27N-1E | 600 | 30 | 0.91 | 900 | No specific use at present. |
| Hudson Creek Site | Hudson Creek | NE¼SW¼ 13-27N-1E | 80 | 10 | 0.56 | 400 | No specific use at present. |
| Gamble Creek Site | Gamble Creek | SW¼NW¼ 29-27N-2E | 20,000 | 525 | 6.19 | 4,600 | Recreation and irrigation. |
| Stream No. 201 Site | Stream No. 201 Unnamed | SW¼SW¼ 30-26N-2E | 600 | 20 | 1.74 | 1,500 | No specific use at present. |
| Stream No. 202 Site | Stream No. 202 Unnamed | SW¼NE¼ 25-26N-1E | 320 | 15 | 1.35 | 1,300 | Same as above. |
| Upper Scandia Creek Site | Scandia Creek | NE¼NW¼ 34-26N-1E | 140 | 10 | 2.12 | 2,300 | Same as above. |
| Lower Scandia Creek Site | Scandia Creek | NE¼SW¼ 27-26N-1E | 80 | 7 | 2.18 | 2,400 | Same as above. |
| Little Scandia Creek Site | Little Scandia Creek | NW¼NE¼ 34-26N-1E | 80 | 7 | 0.37 | 400 | Same as above. |
| North Branch Steele Creek Site | North Branch Steele Creek | SE¼SE¼ 14-25N-1E | 60 | 8 | 2.81 | 3,000 | Same as above. |
| South Branch Steele Creek Site | South Branch Steele Creek | SW¼NE¼ 23-25N-1E | 230 | 20 | 1.71 | 2,100 | Same as above. |
| Mosher Creek Site | Mosher Creek | NE¼SW¼ 34-25N-1E | 70 | 7 | 1.57 | 1,900 | Same as above. |
| Barker Creek Site | Barker Creek | NW¼SW¼ 22-25N-1E | 130 | 15 | 3.71 | 4,200 | Same as above. |
| West Branch Clear Creek Site | West Branch Clear Creek | NE¼SE¼ 8-25N-1E | 2,000 | 75 | 3.44 | 4,200 | Recreation and water supply. |
| Kochs Creek Site | Kochs Creek | NE¼SW¼ 17-25N-1E | 60 | 6 | 2.04 | 2,700 | No specific use at present. |
| Wildcat Creek Site | Wildcat Creek | NW¼NE¼ 12-24N-1W | 1,400 | 40 | 5.75 | 10,200 | Water supply Chico area. Suitable for partial or complete development. |
| Upper Lost Creek Site | Lost Creek | SW¼SW¼ 12-24N-1W | 2,000 | 40 | 2.19 | 5,200 | Same as above. |
| Lower Lost Creek Site | Lost Creek | SE¼NE¼ 12-24N-1W | 1,700 | 40 | 2.93 | 6,800 | Same as above. |
| Parish Creek Site | Parish Creek | SW¼SW¼ 32-24N-1E | 2,000 | 40 | 1.53 | 2,800 | Water supply for Gorst area. Suitable for partial or complete development. |
| Ross Creek Site | Ross Creek | SW¼NE¼ 34-24N-1E | 700 | 30 | 2.02 | 3,200 | Water supply Port Orchard. |
| Upper Blackjack Creek Site | Blackjack Creek | NE¼NE¼ 22-23N-1E | 350 | 15 | 2.66 | 4,500 | Irrigation. |
| Lower Blackjack Creek Site | Blackjack Creek | SE¼NE¼ 35-24N-1E | 1,700 | 45 | 12.13 | 19,400 | No specific use at present. |
| Stream No. 281 Site | Stream No. 281 Unnamed | SE¼NW¼ 25-24N-1E | 130 | 7 | 0.48 | 700 | No specific use at present. |
| Beaver Creek Site | Beaver Creek | SW¼NW¼ 21-24N-2E | 1,000 | 25 | 1.19 | 1,500 | Same as above. |
| Stream No. 294-1 Site | Stream No. 294 -1 Unnamed tributary to Curley Creek | SW¼NE¼ 4-23N-2E | 190 | 6 | 0.77 | 1,100 | Same as above. |
| Stream No. 298 Site | Stream No. 298 Unnamed | NW¼NE¼ 3-23N-2E | 210 | 8 | 0.37 | 480 | Water supply for Harper area. |
| Stream No. 329 Site | Stream No. 329 Unnamed | SW¼NE¼ 13-21N-1E | 600 | 30 | 1.57 | 2,200 | No specific use at present. |
| Warren Creek Site | Warren Creek | SW¼SE¼ 22-21N-1E | 190 | 15 | 0.85 | 1,200 | Water supply for Warren area. |
| Minter Creek Site | Minter Creek | SW¼SE¼ 9-22N-1E | 2,800 | 120 | 4.43 | 7,800 | Recreation. |
| Lackey Creek Site | Lackey Creek | SE¼NW¼ 31-22N-1E | 160 | 15 | 2.18 | 3,600 | No specific use at present. |
| Stream No. 400 Site | Stream No. 400 Unnamed | SW¼SE¼ 28-21N-1W | 350 | 15 | 1.37 | 2,200 | Water supply for Herron area. |
| Fern Lake Site | Rocky Creek | NW¼NW¼ 16-22N-1W | 2,400 | 130 | 3.99 | 7,000 | Enlarge Lake for recreation. |
| Rocky Creek Site | Rocky Creek | NE¼NE¼ 27-22N-1W | 1,300 | 50 | 18.08 | 31,900 | No specific use at present. |
| Coulter Creek Site | Coulter Creek | SW¼NW¼ 25-23N-1W | 380 | 25 | 3.97 | 74,100 | No specific use at present. |
| Stream No. 425-7 Site | Stream No. 425 -7 Unnamed tributary to Coulter Creek | SE¼NW¼ 34-23N-1W | 320 | 15 | 0.72 | 1,300 | Same as above. |
| Stream No. 425-4 Site | Stream No. 425 -4 Unnamed tributary to Coulter Creek | NW¼NE¼ 33-23N-1W | 290 | 15 | 1.54 | 2,800 | Same as above. |
| Stream No. 425-3 Site | Stream No. 425 -3 Unnamed tributary to Coulter Creek | NW¼NW¼ 10-22N-1W | 150 | 6 | 0.63 | 1,100 | Water supply for North Bay area. |

Table 54. POTENTIAL STORAGE SITES IN THE REPORT AREA. (continued)

| Name (owner) | Stream or drainage | Approximate dam location Sec. Twp. Rge | Storage capacity Acre-feet | Inundated area Acres | Tributary drainage area Sq. Mi. | Estimated potential mean annual run-off Acre-feet | Remarks |
|---|---|---|---|---|---|---|---|
| BAINBRIDGE ISLAND | | | | | | | |
| Port Madison Creek Site | Port Madison Creek | NW¼SE¼ 2-25N-2E | 45 | 3 | 0.61 | 450 | No specific use at present. |
| Stream No. 434 Site | Stream No. 434 Unnamed | NE¼SE¼ 15-25N-2E | 260 | 25 | 1.46 | 1,800 | Same as above. |
| Stream No. 437 Site | Stream No. 437 Unnamed | NW¼SW¼ 26-25N-2E | 120 | 6 | 0.53 | 480 | Water supply Winslow area. |
| Stream No. 442 Site | Stream No. 442 Unnamed | NE¼SW¼ 35-25N-2E | 15 | 2 | 0.48 | 490 | Water supply Eagledale area. |
| VASHON AND MAURY ISLANDS | | | | | | | |
| Stream No. 481 Site | Stream No. 481 Unnamed | NE¼SE¼ 5-22N-3E | 550 | 15 | 0.88 | 1,000 | Water supply for Chautaugua area. Other sites possible. |
| Stream No. 482 Site | Stream No. 482 Unnamed | SW¼SE¼ 5-22N-3E | 130 | 6 | 0.40 | 450 | Water supply for Ellisport area. |
| Tahlequah Creek Site | Tahlequah Creek | NE¼SE¼ 2-21N-2E | 200 | 9 | 1.13 | 1,400 | Water supply for Tahlequah area. Other sites possible. |
| Needle Creek Site | Needle Creek | NW¼NW¼ 19-23N-2E | 2,800 | 70 | 2.47 | 2,900 | Water supply for Colvos-Cedarhurst area. Other sites possible. Suitable for partial or complete development. |

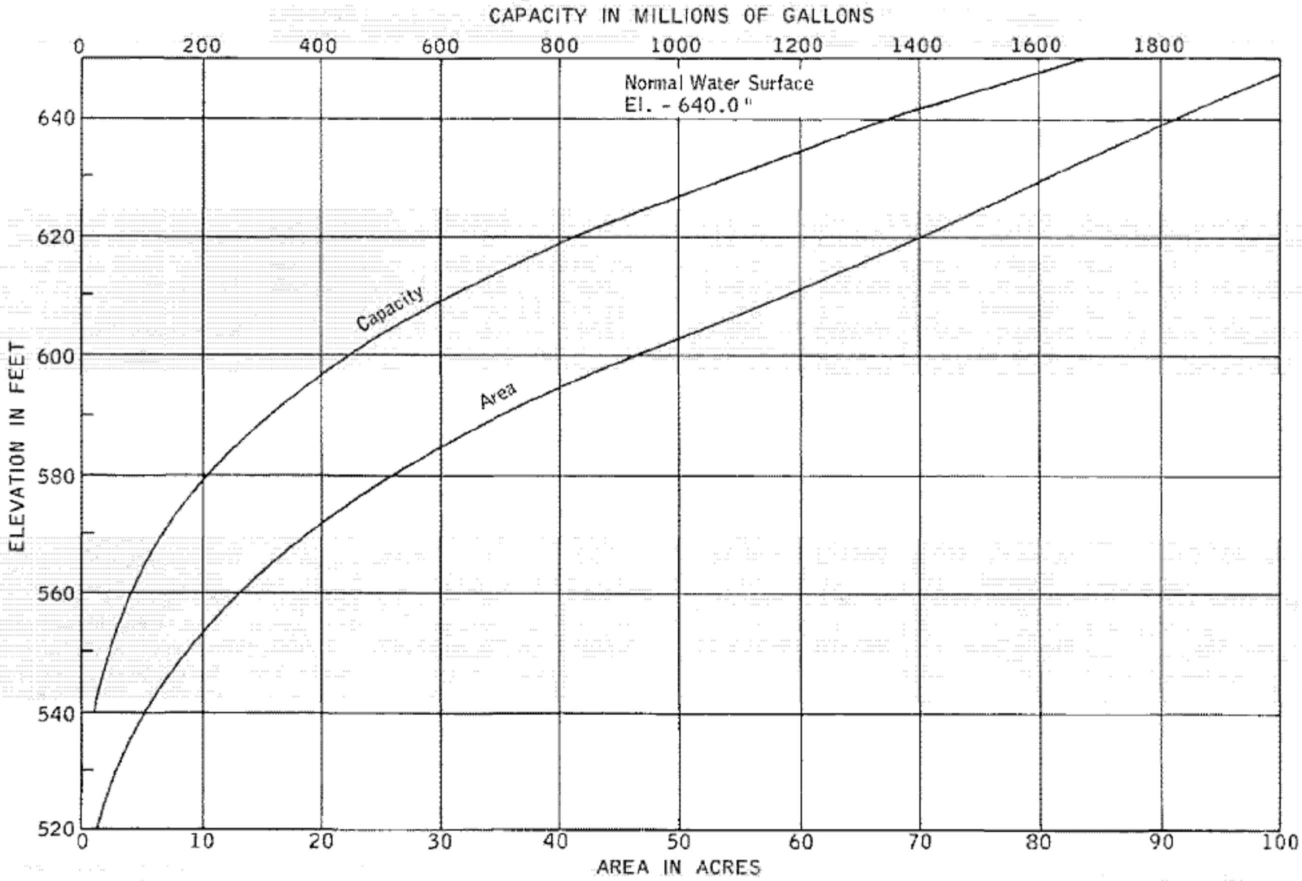



Figure 83. RESERVOIR AREA AND CAPACITY CURVES, UNION RIVER RESERVOIR

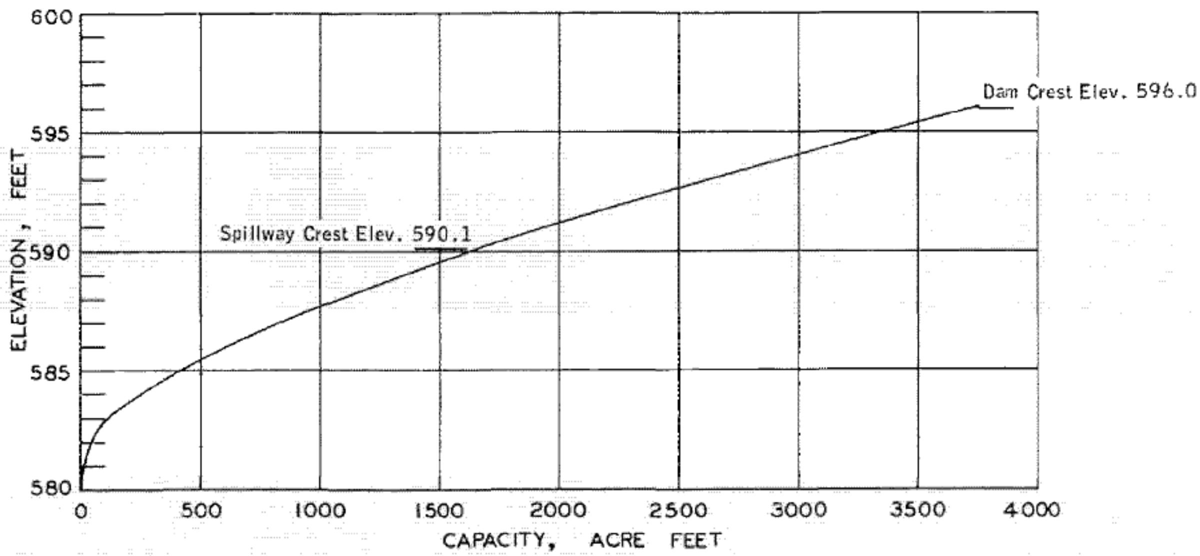



Figure 84. RESERVOIR CAPACITY CURVE, TAHUYA LAKE.

## GOLD CREEK SITE

Kitsap County Public Utility District No. 1 has proposed the construction of a dam and reservoir on upper Gold Creek to provide a water supply system for the area immediately west of Bremerton. The site is located approximately one-quarter of a mile upstream from gaging station No. 0655 in the narrowest part of the gap between Green and Gold Mountains. A preliminary engineering report (Beck, 1960) showed that a dam at this location would impound runoff from approximately 1.36 square miles, and with a normal pool elevation at 808 feet, would have a capacity to store 2,700 acre-feet of water. By comparison the drainage area actually produces a mean annual runoff of 54 inches or about 3900 acre-feet (1946-60 period). The proposed reservoir capacity would provide a constant usable supply of about 2.4 million gallons per day which allows for approximately 1100 acre-feet of dead storage and a continual minimum release of 0.3 cfs to sustain downstream fish life.

A superficial investigation of the site indicated that a good foundation of basalt bedrock lies close to the existing surface. This underlying formation appears to be quite water-tight so seepage losses from the storage area would probably be negligible. The preliminary design study further indicated that the dam would need about 100,000 cubic yards of earth fill and would use a spillway capable of passing 1100 cfs. This capacity would be more than five times the recorded maximum instantaneous flow at Gage No. 0655 (table 10).

Two pipeline routes are possible to deliver the supply to the service area. One would follow Lost Creek and terminate near the north end of Kitsap Lake. The other, a shorter route, would run about due east from the reservoir to the south end of Kitsap Lake. Both routes would require some initial pumping to lift the supply about 80 feet from the reservoir to the watershed divide. The water would then flow by gravity to the area of distribution. To handle peak demand flows, the transmission line would be designed to have a capacity of 6 million gallons per day.

## TAHUYA LAKE PROJECT

In 1961 a dam was constructed on the Tahuya River a short distance below the confluence of Gold Creek to deepen and enlarge Lake Tahuya for purposes of land development and recreation. Located in the SE¼NW¼ sec. 20, T. 24 N., R. 1 W.W.M., this earth-fill structure is seated on basalt bedrock and is flanked by compacted layers of glacial till. Rising about 25 feet above the bed of the river to an elevation of 596 feet, the dam creates a backwater of nearly a mile and impounds about 1650 acre-feet at the elevation of the spillway crest (590.1 feet). Figure 84 shows the reservoir capacity at other elevations up to the top of the dam. The reservoir, thus created, eliminated most of the swamp and marsh area that surrounded the original lake and provided about three miles of improved shoreline for lake-shore property development.

A drainage area of 5.76 square miles contributes a mean annual runoff of about 50 inches or 15,400 acre-feet to this reservoir. The maximum recorded instantaneous discharge of the river at Gage No. 0660, located about three-quarters of a mile downstream from the site, was 504 cfs on November 3, 1955. To handle future floods, the structure employs a concrete overflow spillway capable of discharging 700 cfs under a head of 4.15 feet above the normal lake level. A fish ladder is also incorporated in the spillway structure to allow for passage of anadromous fish. This fishway and an outlet pipe permits the structure to pass an additional 100 cfs. Since none of the stored water is diverted or used consumptively, outflow from the reservoir is at all times equal to the natural inflow, minus any change in storage and minus any intervening losses through evaporation or seepage.

In 1950 the City of Bremerton filed an application with the Division of Water Resources to divert up to 20 cfs from this same general location on the Tahuya River to augment their existing municipal supply. Under the proposed plans, waters from the Tahuya River and up to 5 cfs from Mission Creek would be piped to existing facilities at Twin Lakes. Quality problems and recent developments, however, make the feasibility of such a project somewhat questionable, and it is doubtful whether it will ever be constructed.

## LOWER TAHUYA RIVER SITES

From a superficial examination, two reservoir sites along the lower reaches of the Tahuya River appear to be feasible. The smaller of the two projects would involve construction of a dam across a narrow constriction of the river channel where it crosses the west line of sec. 5, T. 22 N., R. 2 W.W.M. At this location it appears that a dam, 70 feet high and 700 feet long at the crest, could impound water to an elevation of about 200 feet. Water impounded to that elevation would create a lake 2.5 miles long with a surface area of 0.53 square miles and a volume of about 11,100 acre-feet. The project would receive runoff from a 37.7 square-mile drainage area which in the mean has a potential to contribute about 42 inches or 84,000 acre-feet per year (1946-60 period).

For the larger development, a dam would be constructed across the river in the SW¼ sec. 12, T. 22 N., R. 3 W.W.M., near the location of stream Gage No. 0680. Though this site would require a larger dam, the higher cost might be offset by greater benefits from the increased storage capacity. Topography in the abutment areas indicates that it might be feasible to impound water to an elevation as high as 240 feet. To maintain water at this level would require a dam approximately 200 feet high and about 2,000 feet long at its crest. Such a structure would create a 6 mile long lake with a surface area of about 2.54 square miles. This artificial lake would completely inundate the reservoir area of the smaller project and would have a storage capacity of about 111,700 acre-feet. Potential mean annual runoff from the 42.2 square miles of drainage area above this site amounts to 42 inches or 94,300 acre-feet so, in an average year, inflow to the reservoir would be adequate to replace about 85 percent of the total capacity.

If detailed geologic and engineering studies showed either of the sites to be structurally feasible, and if economic considerations proved such a development to be sound, it would be necessary to establish the final size of either project according to maximum derivable benefits.

## GAMBLE CREEK SITE

Assuming geologic conditions are favorable, the topography indicates that a sizable reservoir could be created along the lower reaches of Gamble Creek. The most probable dam site is located in the NW¼ sec. 29, T. 27 N., R. 2 E.W.M., at a point where the stream passes through a narrow gap about one half a mile above its mouth. Here a dam 80 feet high and about 600 feet long could impound water to an elevation of 120 feet and create a lake with a surface area of approximately 0.82 square mile. A reservoir of this size, having a capacity of nearly 20,000 acre-feet, would represent the maximum possible development of this site, but it would not necessarily be the most economical. The 6.19 square-mile drainage area tributary to the site produces a mean annual potential runoff of only 14 inches or about 4600 acre-feet (1946-60 period); consequently, it is probable that it would take more than 4 years to initially fill the reservoir. Excessive loss through evaporation from this large surface area also might tend to make the maximum development undesirable.

A more practical development might be obtained by limiting the reservoir elevation to about 80 feet. At this level the artificial lake would occupy only half as much area and would store about 3900 acre-feet which could normally be replaced each year. The smaller project, however, would probably be limited to recreation and irrigation use, since the maximum depth of the lake would be only about 20 feet making it undesirable for a domestic water supply reservoir. Whatever size the project might be, a few buildings lying in the reservoir area would have to be condemned and 2 to 3 miles of highway relocated.

# WATER QUALITY

By A. S. Van Denburgh*

## GENERAL

All natural water contains dissolved material. The quantity of dissolved material in water ranges from about 0.001 percent for rainwater to about 30 percent for highly concentrated brines. Through experience man has learned that many water uses--private, agricultural, and industrial--place certain limits on the allowable concentration of various dissolved constituents in water. The State's water supply must therefore be monitored, not only to determine the concentration of dissolved organic and inorganic material but also to aid in the protection of future quality.

The survey of the chemical and physical qualities of both ground and surface waters of the Kitsap Peninsula and certain adjacent islands was a cooperative project by the Washington State Division of Water Resources and the United States Geological Survey. Because little basic data were available before the project's start, an intensive program of water-quality data collection was necessary. This program involved sampling and later resampling of 19 streams and one lake. In addition, 39 ground-water sources (38 wells and one spring) were sampled. Compilations of the chemical and physical data for the surface and ground waters, along with interpretation of these data, appear on the following pages.

## EXPRESSION OF WATER-QUALITY DATA

The analyses in tables 55 and 56 show the concentration of as many as 19 constituents or properties of each water sample. Chemical constituents, dissolved solids, and hardness of water are reported in parts per million (ppm). A part per million is a unit weight of a constituent in a million unit weights of water.

Iron concentrations are assumed to represent iron in solution at the time of sample collection, unless they are termed "total iron". The term "total iron" applies to iron concentrations in samples that are turbid or that contain sediment at the time of collection. The distinction is made because both the material forming the turbid suspension and the sediment can contain iron which contributes to the reported iron value.

Either of two methods is used to determine the dissolved-solids content of a water sample. The determined constituents are added together or a known volume of sample is evaporated and weighed. Determinations made by the two methods usually differ by less than 10 percent. However, in some water the high content of organic or colloidal material or appreciable quantities of certain inorganic constituents will produce a significant numerical difference between these two expressions of dissolved material. Only the calculated values (sum of determined constituents) for dissolved-solids contents will be referred to in this report unless otherwise noted.

The hardness-of-water determination involves measurement of the combined concentrations of calcium and magnesium. These two constituents are the ones primarily responsible for hardness, a characteristic that is indicated by the deposition of calcium compounds in hot water lines and other heat exchange equipment and by excessive soap consumption. Hardness data are reported as the calcium carbonate equivalent of the concentration of calcium plus magnesium.

Several properties of water are not expressed in parts per million units. Specific conductance, for example, is expressed in micromhos at 25°C. This determination is simply the measure of how readily an electric current will pass through water. In general the greater the amount of dissolved material in the water the more readily an electric current will pass through it. Specific conductance is thus a rough measure of the amount of dissolved material in water. Numerically, the dissolved-solids content of water usually is about two-thirds to three-fourths of the specific conductance value. The pH of water, a measure of its acidity or alkalinity, is expressed in terms of pH units, which express the negative logarithm of hydrogen-ion ($H^+$) concentration. The color of a water is based on comparison with a standard color intensity scale and is reported in color units.

## WATER QUALITY STANDARDS

Many mandatory and recommended standards have been established for drinking water as well as for water utilized in specific industrial applications. The revised drinking water standards of the U. S. Public Health Service (1962) are shown in Tables 57 and 58. These limits in general have been adopted throughout the United States as standards of drinking water quality. In 1950 the American Water Works Association published a compilation of water quality tolerances for various industrial applications. A part of this compilation is shown in Table 59. The data are useful in predicting the suitability of a specific water supply for a specific industrial application.

No universally used classification of the degree of water hardness is available, because the requirements for different industrial applications vary so widely (see Table 59). However, water having less than 60 ppm of hardness is generally considered to be soft, whereas a value between 61 and 120 ppm indicates moderate hardness. Water in the 61 to 120 ppm range is still suitable for many purposes without treatment. However, if hardness exceeds 120 ppm, softening is profitable for some uses, and if hardness is greater than 180 ppm the water is considered very hard, and it requires treatment for almost all purposes.

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*Geologist, U. S. Geological Survey, Water Resources Division, Tacoma, Washington.

Table 55. ANALYSES OF GROUND-WATER SAMPLES FROM THE KITSAP PENINSULA AND ADJACENT ISLANDS, WASHINGTON (analyses by the U. S. Geological Survey).

| Sampling site number | Well number | Owner | Approx. altitude above sea level (in feet) | Well depth (in feet) | Depth of water-bearing interval (in feet) | Geologic source of ground water a/ | Sample collection date | Temperature (°F) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 20/1W-11C | Peninsula School District No. 401 | 220 | 224 | 198-224 | Qc | 3/1/61 | 49 | 32 | 0.26 | 7.5 | 6.5 | 4.5 |
| 2 | 20/1W-24F | John Conboy | 75 | 285 | 70-180 | Qss? | 3/1/61 | 49 | 41 | 0.13 | 30 | 7.6 | 10 |
| 3 | 21/1W-2C | Peninsula School District No. 401 | 50 | 158 | 82-88 | Qc | 3/1/61 | 49 | 28 | 0.02 b/ | 11 | 5.9 | 5.5 |
| 4 | 21/1-35D | Shorewood Beach Water Company | 25 | 432 | 358-378 | Below Qss | 3/1/61 | 51 | 41 | 0.62 | 21 | 15 | 10 |
| 6 | 21/2-1L | (b) (6) [redacted] | 300 | 180 | 170-180 | Qc | 3/3/61 | 47 | 38 | 0.48 | 5.5 | 5.6 | 5.0 |
| 5 | 21/2-8C | Gig Harbor Water Department | 60 | 375 | 73-75 | Qss | 3/2/61 | 50 | 34 | 0.22 | 12 | 6.9 | 5.5 |
| 7 | 22/2W-1C | Terra Linda Auto Court | 15 | 42 | ? | Above Qc | 3/2/61 | 50 | 21 | 0.02 | 9.0 | 3.6 | 3.0 |
| 8 | 22/3W-26Q | (b) (6) [redacted] | 10 | 55 | 51-55 | Above Qc ? | 3/2/61<br>8/16/61 | 48<br>52 | 19<br>19 | 0.20<br>0.21 b/ | 11<br>31 | 4.4<br>13 | 22<br>60 |
| 9 | 22/1-1M2 | | 40 | 62 | 55-62 | Qss | 10/4/60<br>5/25/61 | 54<br>56 | 29<br>-- | 0.11<br>-- | 14<br>-- | 3.8<br>-- | 4.6<br>-- |
| 10 | 22/1-8H1 | | 305 | 100 | 80-100 | Qc or above | 3/1/61 | 48 | 20 | 0.05 | 6.0 | 2.9 | 3.0 |
| 11 | 22/1-12D2 | | 25 | 353 | 343-353 | Below Qss | 10/4/60<br>5/25/61 | 50<br>51 | 38<br>-- | 0.09<br>-- | 12<br>-- | 1.5<br>-- | 19<br>-- |
| 12 | 22/1-12R2 | | 120 | 18 | 8-18 | Above Qc | 10/4/60<br>5/25/61 | 58<br>58 | 18<br>-- | 0.03<br>-- | 15<br>-- | 1.8<br>-- | 11<br>-- |
| 13 | 22/3-16F1 | Queens City Broadcasting Co. | 50 | 462 | 445-460 | Below Qss | 12/16/59<br>7/5/60 | 54<br>66 | 41<br>-- | 1.3 b/<br>-- | 45<br>-- | 19<br>-- | 43<br>-- |
| 14 | 23/2W-13H1 | Wash. State Dept. of Institutions | 400 | 180 | 170-180 | Qc | 5/23/61 | 48 | 24 | 0.04 | 10 | 4.4 | 3.1 |
| 15 | 23/1-7D | Sunnyslope Water Development Co. | 470 | 219 | 102-119 | Qc | 3/2/61 | 40 | 25 | 0.01 | 9.0 | 4.5 | 3.7 |
| 16 | 23/1-10A1 | (b) (6) [redacted] | 215 | 184 | 174-184 | Qc or Qss | 2/28/61 | 50 | 24 | 0.01 | 10 | 7.1 | 4.3 |
| 17 | 23/1-26H2 | | 190 | 90 | 55-70? | Qc | 2/28/61 | 49 | 36 | 0.81 b/ | 8.0 | 7.1 | 3.7 |
| 18 | 23/2-2C3 | | ? | ? | ? | Qss? | 10/4/60<br>5/25/61 | 54<br>54 | 33<br>-- | 0.05<br>-- | 15<br>-- | 8.8<br>-- | 7.8<br>-- |
| 19 | 23/2-28K3 | | 340 | 98 | ? | Qc | 3/2/61 | 45 | 24 | 0.01 | 6.5 | 3.9 | 3.6 |
| 20 | 23/3-29Q SPRING | King Co. Water District No. 19 | 125 ± 25 | 0 | 0 | Qc | 3/3/61 | 47 | 28 | 0.01 b/ | 10 | 8.6 | 6.0 |
| 21 | 24/1W-2G | (b) (6) [redacted] | 390 | 65 | 60-65? | Above Qc | 2/28/61 | -- | 20 | 0.16 b/ | 12 | 3.2 | 7.1 |
| 22 | 24/1W-7C1 | | 500 | 140 | 137-140 | Qc | 2/28/61 | 47 | 21 | 0.07 | 8.0 | 5.1 | 3.3 |
| 23 | 24/1W-29Q1 | | 525 | 85 | 15-28 | Above Qc | 10/4/60<br>5/25/61 | 51<br>51 | 17<br>-- | 0.85 b/<br>-- | 22<br>-- | 1.5<br>-- | 7.9<br>-- |

a/ Geologic source determined by use of chemical and (or) geologic information.
Qc and Qss are geologic symbols for the Colvos Sand and Salmon Springs(?) Drift.

b/ Total iron (concentrations not footnoted represent iron in solution at the time of sample collection).

| Parts per million | | | | | | | | | | | Specific conductance (Micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Dissolved Solids | | | | | |
| Potassium | Bicarbonate ($HCO_3$) | Carbonate | Sulfate | Chloride | Fluoride | Nitrate | Phosphate | Calculated | Residue on evap. at 180°C | Hardness (as $CaCO_3$) | | | |
| 0.8 | 64 | 0 | 0.2 | 2.5 | 0.1 | 0.6 | 0.08 | 87 | 83 | 46 | 111 | 7.2 | 0 |
| 4.9 | 156 | 0 | 0.4 | 2.8 | 0.1 | 0.7 | 0.49 | 175 | 171 | 106 | 250 | 7.8 | 5 |
| 0.2 | 73 | 0 | 0.0 | 3.5 | 0.1 | 0.1 | 0.08 | 90 | 83 | 52 | 125 | 7.6 | 0 |
| 3.4 | 163 | 0 | 0.4 | 4.5 | 0.1 | 0.2 | 0.39 | 177 | 168 | 112 | 258 | 7.7 | 10 |
| 1.0 | 42 | 0 | 11 | 2.8 | 0.1 | 0.1 | 0.18 | 91 | 90 | 36 | 104 | 7.4 | 5 |
| 1.8 | 83 | 0 | 0.4 | 2.2 | 0.1 | 0.3 | 0.87 | 105 | 99 | 58 | 141 | 7.8 | 0 |
| 0.0 | 47 | 0 | 0.2 | 2.2 | 0.0 | 2.0 | 0.03 | 64 | 64 | 38 | 91 | 6.6 | 0 |
| 0.4 | 90 | 0 | 3.6 | 13 | 0.1 | 0.0 | 0.35 | 118 | 113 | 46 | 189 | 7.9 | 0 |
| 1.4 | 76 | 0 | 19 | 132 | -- | -- | -- | 312 | -- | 132 | 595 | 7.5 | -- |
| 1.8 | 70 | 0 | 4.8 | 1.8 | 0.1 | 0.1 | 0.28 | 94 | 92 | 50 | 122 | 8.1 | 5 |
| -- | 70 | 0 | -- | -- | -- | -- | -- | -- | -- | 50 | 124 | 8.0 | -- |
| 0.0 | 29 | 0 | 0.2 | 3.0 | 0.0 | 6.0 | 0.07 | 55 | 59 | 27 | 73 | 7.4 | 0 |
| 2.6 | 92 | 1 | 0.8 | 1.5 | 0.1 | 0.1 | 0.27 | 122 | 120 | 36 | 151 | 8.3 | 5 |
| -- | 92 | 1 | -- | -- | -- | -- | -- | -- | -- | 35 | 152 | 8.3 | -- |
| 0.9 | 46 | 0 | 15 | 9.0 | 0.0 | 4.9 | 0.04 | 99 | 100 | 45 | 151 | 6.3 | 5 |
| -- | 54 | 0 | -- | -- | -- | -- | -- | -- | -- | 48 | 146 | 6.5 | -- |
| 7.4 | 346 | 0 | 0.3 | 8.8 | 0.3 | 0.5 | 0.59 | 338 | 346 | 190 | 545 | 7.6 | 10 |
| -- | 330 | 0 | -- | -- | -- | -- | -- | -- | -- | 184 | 511 | 7.8 | -- |
| 0.4 | 60 | 0 | 0.0 | 1.5 | 0.1 | 0.2 | 0.15 | 74 | 76 | 43 | 97 | 7.8 | 0 |
| 0.5 | 60 | 0 | 0.4 | 1.2 | 0.0 | 0.1 | 0.11 | 75 | 68 | 41 | 99 | 8.0 | 0 |
| 0.8 | 72 | 0 | 1.8 | 2.0 | 0.1 | 0.1 | 0.28 | 85 | 85 | 54 | 124 | 7.6 | 0 |
| 1.0 | 62 | 0 | 4.4 | 2.0 | 0.1 | 0.2 | 0.11 | 94 | 96 | 49 | 115 | 7.2 | 20 |
| 2.1 | 105 | 0 | 3.6 | 1.5 | 0.1 | 0.1 | 0.43 | 124 | 120 | 74 | 176 | 8.1 | 5 |
| -- | 106 | 0 | -- | -- | -- | -- | -- | -- | -- | 74 | 178 | 7.9 | -- |
| 0.2 | 35 | 0 | 2.4 | 3.8 | 0.1 | 4.4 | 0.09 | 66 | 70 | 32 | 85 | 7.3 | 0 |
| 1.2 | 44 | 0 | 20 | 6.0 | 0.1 | 10 | 0.07 | 112 | 116 | 60 | 158 | 7.3 | 5 |
| 0.3 | 50 | 0 | 6.8 | 5.2 | 0.1 | 2.0 | 0.00 | 82 | 88 | 43 | 123 | 6.1 | 0 |
| 0.0 | 56 | 0 | 0.2 | 1.2 | 0.0 | 0.3 | 0.26 | 67 | 65 | 41 | 93 | 7.7 | 0 |
| 0.3 | 90 | 0 | 4.4 | 1.2 | 0.0 | 0.1 | 0.06 | 98 | 98 | 61 | 152 | 7.9 | 5 |
| -- | 92 | 0 | -- | -- | -- | -- | -- | -- | -- | 62 | 155 | 8.1 | -- |

Table 55. ANALYSES OF GROUND-WATER SAMPLES FROM THE KITSAP PENINSULA AND ADJACENT ISLANDS, WASHINGTON (analyses by the U. S. Geological Survey). (Continued)

| Sampling site number | Well number | Owner | Approx. altitude above sea level (in feet) | Well depth (in feet) | Depth of water-bearing interval (in feet) | Geologic source of ground water a/ | Sample collection date | Temperature (°F) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 24/1W-35P1 | (b) (6) [redacted] | 330 | 87-1/2 | 74-79 | Above Qc | 10/4/60 | 49 | 21 | 1.3 b/ | 7.0 | 2.7 | 2.8 |
| | | | | | | | 5/25/61 | 50 | -- | -- | -- | -- | -- |
| 25 | 24/1-25M1 | Town of Port Orchard Well 6 | 20 | 832 | 805-832 | Qss | 3/3/61 | 49 | 35 | 0.04 | 18 | 3.6 | 5.5 |
| 26 | 24/1-26N1 | Wilkins Dist. Co. | 20 | 197 | 88-190 | Qss | 10/4/60 | 47 | 36 | 0.05 | 18 | 3.2 | 5.1 |
| | | | | | | | 4/26/61 | 49 | -- | -- | 17 | 4.1 | -- |
| 27 | 24/1-33K5 | City of Bremerton Well 5 | 35 | 587 | ? | Qss | 12/16/59 | 54 | 31 | 0.01 | 15 | 2.6 | 6.9 |
| | | | | | | | 6/3/60 | 54 | -- | -- | -- | -- | -- |
| 28 | 24/2-33H1 | (b) (6) [redacted] | 20 | 134 | 133-134 | Qss | 2/28/61 | 51 | 38 | 0.06 | 15 | 2.2 | 17 |
| 29 | 25/1-9G1 | | 80 | 164 | 135-140 | Qss | 6/3/60 | 58 | 37 | 0.08 | 13 | 6.6 | 6.3 |
| | | | | | | | 10/5/60 | 54 | -- | -- | -- | -- | -- |
| 30 | 25/1-23K | | 190 | 69 | ? | Qc ? | 2/28/61 | 47 | 20 | 3.3 b/ | 10 | 6.1 | 4.7 |
| 31 | 25/2-26K | | 120 | 175 | 171-175 | Qss | 2/1/61 | 50 | 35 | 0.45 | 18 | 5.8 | 5.6 |
| 32 | 25/2-35H3 | Baxter-Wycoff Co. | 10 | 813 | 90-105 &697-780 | Qss and below | 10/5/60 | 53 | 26 | 0.04 b/ | 20 | 12 | 18 |
| | | | | | | | 5/25/61 | 56 | -- | -- | -- | -- | -- |
| 33 | 25/2-35M2 | (b) (6) [redacted] | 260 | 148 | 143-148 | Qc | 2/27/61 | 50 | 28 | 2.3 b/ | 11 | 12 | 7.5 |
| 34 | 26/1-13J1 | | 310 | 144 | 130-144 | Qc | 2/28/61 | 48 | 24 | 0.15 | 8.0 | 4.0 | 4.0 |
| 35 | 26/1-36P1 | U. S. Navy | 14 | 380 | ? | Qss | 10/5/60 | 53 | 33 | 0.24 | 28 | 5.3 | 20 |
| | | | | | | | 5/25/61 | 55 | -- | -- | -- | -- | -- |
| 36 | 26/2-10Q1 | (b) (6) [redacted] | 125 | 260 | 254-260 | Qss | 2/27/61 | 48 | 35 | 0.59 | 9.0 | 8.7 | 6.0 |
| 37 | 27/2-25N1 | State of Wash. | 5 | 298 | 266-272? | Qss? | 2/27/61 | 52 | 39 | 0.15 | 14 | 9.2 | 16 |
| 38 | 27/2-28G1 | (b) (6) [redacted] | 165 | 134 | 128-134 | Qc | 2/27/61 | 47 | 28 | 0.27 | 7.5 | 6.4 | 4.5 |
| 39 | 28/2-35M2 | | 150 | 107 | 103-107 | Qc | 2/27/61 | 49 | 31 | 0.04 | 15 | 11 | 7.6 |

a/ Geologic source determined by use of chemical and (or) geologic information. Qc and Qss are geologic symbols for the Colvos Sand and Salmon Springs(?) Drift.

b/ Total iron (concentrations not footnoted represent iron in solution at the time of sample collection).

| Parts per million | | | | | | | | | | | Specific conductance (Micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Potassium (K) | Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Phosphate ($PO_4$) | Dissolved Solids | | Hardness (as $CaCO_3$) | | | |
| | | | | | | | | Calculated | Residue on evap. at 180°C | | | | |
| 0.4 | 34 | 0 | 0.8 | 2.5 | 0.0 | 4.0 | 0.02 | 58 | 60 | 29 | 74 | 7.0 | 5 |
| -- | 46 | 0 | -- | -- | -- | -- | -- | -- | -- | 35 | 87 | 7.2 | -- |
| 1.4 | 81 | 2 | 1.2 | 1.2 | 0.0 | 0.1 | 0.34 | 108 | 105 | 60 | 142 | 8.4 | 0 |
| 1.3 | 79 | 0 | 3.6 | 1.8 | 0.1 | 0.3 | 0.35 | 109 | 108 | 58 | 137 | 8.0 | 5 |
| -- | 79 | 1 | -- | -- | -- | -- | -- | -- | -- | 59 | 138 | 8.4 | -- |
| 1.7 | 69 | 2 | 3.4 | 1.5 | 0.3 | 0.0 | 0.38 | 99 | 101 | 48 | 129 | 8.3 | 0 |
| -- | 70 | 2 | -- | -- | -- | -- | -- | -- | -- | 48 | 133 | 8.4 | -- |
| 2.0 | 95 | 2 | 0.0 | 4.8 | 0.1 | 0.1 | 0.91 | 129 | 119 | 46 | 168 | 8.5 | 5 |
| 3.0 | 88 | 0 | 0.4 | 2.5 | 0.1 | 0.5 | 1.1 | 114 | 108 | 60 | 145 | 7.7 | 5 |
| -- | 89 | 0 | -- | -- | -- | -- | -- | -- | -- | 59 | 148 | 7.9 | -- |
| 0.4 | 65 | 0 | 3.2 | 2.2 | 0.0 | 1.4 | 0.08 | 80 | 81 | 50 | 121 | 6.8 | 5 |
| 2.0 | 91 | 0 | 4.0 | 2.8 | 0.2 | 0.3 | 0.39 | 120 | 113 | 69 | 159 | 7.3 | 10 |
| 2.0 | 154 | 0 | 6.6 | 5.2 | 0.1 | 0.1 | 0.19 | 166 | 164 | 100 | 264 | 8.2 | 0 |
| -- | 154 | 0 | -- | -- | -- | -- | -- | -- | -- | 100 | 263 | 8.2 | -- |
| 0.6 | 89 | 0 | 5.8 | 6.0 | 0.1 | 5.3 | 0.11 | 120 | 114 | 77 | 184 | 7.4 | 10 |
| 0.4 | 34 | 0 | 0.2 | 6.2 | 0.0 | 10 | 0.11 | 74 | 70 | 36 | 101 | 7.5 | 0 |
| 1.9 | 129 | 0 | 0.4 | 22 | 0.1 | 3.4 | 2.0 | 180 | 182 | 92 | 274 | 7.6 | 5 |
| -- | 130 | 0 | -- | -- | -- | -- | 2.1 | -- | -- | 92 | 266 | 7.8 | -- |
| 2.0 | 72 | 0 | 7.0 | 4.8 | 0.1 | 0.2 | 0.24 | 109 | 103 | 58 | 146 | 7.4 | 5 |
| 3.2 | 126 | 0 | 0.0 | 5.5 | 0.1 | 0.1 | 0.82 | 150 | 149 | 73 | 213 | 8.1 | 5 |
| 0.8 | 56 | 0 | 5.6 | 2.0 | 0.1 | 0.5 | 0.16 | 84 | 85 | 44 | 110 | 7.8 | 5 |
| 2.5 | 86 | 0 | 15 | 8.2 | 0.1 | 0.9 | 0.26 | 134 | 128 | 82 | 200 | 7.9 | 0 |

Table 56. ANALYSES OF SURFACE WATER FROM THE KITSAP PENINSULA AND ADJACENT ISLANDS, WASHINGTON. (Analyses by the U. S. Geological Survey).

| Sampling site number | Name of stream or lake | Sampling site location | Area of drainage basin upstream from sample site (square miles) | Sample collection date | Estimated streamflow (cubic feet per second) | Water temperature (°F) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| KP1 | Union River | At McKenna Falls (24/1W-34G) | 3.16a/ | 2/3/61 | 20-30 | 43 | 11 | .16b/ | 6.5 | 1.5 | 1.6 |
| | | | | 8/16/61 | 3-8 | 65 | 11 | .22 | 8.5 | 2.3 | 2.0 |
| KP2 | Union River | 1.5 mi. N of Belfair (23/1W-20G) | 19.2 a/ | 2/1/61 | 75-100 | 44 | -- | -- | 5.0 | 1.6 | -- |
| | | | | 8/16/61 | 30-50 | 53 | -- | -- | -- | -- | -- |
| KP3 | Tahuya Ck. | 3 mi. NE of Tahuya (22/3W-13C?) | 42.3 | 2/2/61 | 300-600 | 44 | -- | -- | 2.5 | 0.5 | -- |
| | | | | 8/16/61 | 10-15 | 58 | -- | -- | -- | -- | -- |
| KP4 | Dewatto Ck. | 2 mi. NE of Dewatto (23/3W-23F) | 18.4 | 2/2/61 | 450 c/ | 43 | 7.9 | 0.10b/ | 3.0 | 0.4 | 1.0 |
| | | | | 8/16/61 | 18 c/ | -- | 18 | -- | 8.0 | 3.2 | 2.4 |
| KP5 | Anderson Ck. | 0.8 mi. NE of Holly (24/2W-17N) | 5.58 | 2/2/61 | 50-75 | 44 | -- | -- | 3.0 | 0.8 | -- |
| | | | | 8/16/61 | 5-10 | 54 | -- | -- | -- | -- | -- |
| KP6 | Seabeck Ck. | 1 mi. SW of Seabeck (25/1W-29E) | 4.76 | 2/2/61 | 40-60 | 43 | -- | -- | 2.0 | 0.4 | -- |
| | | | | 8/16/61 | 0.5-1 | 53 | -- | -- | -- | -- | -- |
| KP7 | Grover's Ck. | 3 mi. SW of Kingston (26/2-4M) | 6.45 | 2/27/61 | 10-15 | 42 | -- | -- | 6.5 | 3.4 | -- |
| | | | | 8/15/61 | 1-2 | 60 | -- | -- | -- | -- | -- |
| KP8 | Dogfish Ck. | 1 mi. N of Poulsbo (26/1-11P) | 5.01 | 2/1/61 | 30 c/ | 44 | 18 | 0.45b/ | 9.5 | 5.2 | 3.5 |
| | | | | 8/15/61 | 3 c/ | 60 | 28 | -- | 12 | 8.1 | 5.0 |
| KP9 | Clear Ck. | 1.2 mi. NE of Silverdale (25/1-16C) | 7.46 | 2/1/61 | 10-20 | 44 | -- | -- | 5.0 | 2.5 | -- |
| | | | | 8/15/61 | 5-10 | 58 | -- | -- | -- | -- | -- |
| KP10 | Kitsap Lake | 1.1 mi. NW of Bremerton (24/1-8P) | -- | 2/1/61 | -- | 42 | -- | -- | 7.0 | 2.6 | -- |
| | | | | 8/16/61 | -- | 72 | -- | -- | -- | -- | -- |
| KP11 | Chico Ck. | 1.6 mi. NW of Bremerton (24/1-8E) | 12.2 | 2/1/61 | 50-75 | 44 | -- | -- | 5.5 | 1.4 | -- |
| | | | | 8/16/61 | 2 c/ | 58 | -- | -- | -- | -- | -- |
| KP12 | Blackjack Ck. | At Port Orchard (24/1/26J) | 12.3 | 1/31/61 | 75-150 | 46 | 11 | 0.45b/ | 5.0 | 1.4 | 2.0 |
| | | | | 8/15/61 | 15 | 58 | 24 | -- | 8.5 | 5.3 | 4.2 |
| KP13 | Curley Ck. | 0.9 mi. SW of South Colby (23/2-4F) | 12.4 | 1/31/61 | 50-75 | 45 | -- | -- | 4.5 | 2.4 | -- |
| | | | | 8/15/61 | 5 | 63 | -- | -- | -- | -- | -- |
| KP14 | Olalla Ck. | 1.5 mi. W of Olalla (22/2-5B) | 3.88 | 1/31/61 | 15-20 | 46 | -- | -- | 5.0 | 2.5 | -- |
| | | | | 8/15/61 | 5-10 | 57 | -- | -- | -- | -- | -- |
| KP15 | Artondale Ck. | At Artondale (21/1-13P) | 2.64 | 2/2/61 | 10-15 | 43 | -- | -- | 4.5 | 2.1 | -- |
| | | | | 8/15/61 | 0.5-1 | 59 | -- | -- | -- | -- | -- |
| KP16 | Burley Ck. | At Burley (22/1-12D) | 10.7 | 1/31/61 | 79 c/ | 46 | -- | -- | 5.5 | 2.5 | -- |
| | | | | 8/15/61 | 19 c/ | 55 | -- | -- | -- | -- | -- |
| KP17 | Minter Ck. | 3.2 mi. W of Purdy (22/1-20K) | 15.0 | 2/2/61 | 75-100 | 43 | -- | -- | 3.0 | 1.0 | -- |
| | | | | 8/15/61 | 20 | 54 | -- | -- | -- | -- | -- |
| KP18 | Coulter Ck. | 2.5 mi. SE of Belfair (22/1W-9B) | 3.40 | 2/1/61 | 75-100 | 43 | -- | -- | 2.5 | 0.6 | -- |
| | | | | 8/16/61 | 10-15 | 55 | -- | -- | -- | -- | -- |
| BA1 | Unnamed Ck. | 0.5 mi. E of Fletcher Bay (25/2-20J) | 0.92 | 2/1/61 | 15-20 | 44 | -- | -- | 5.5 | 2.2 | -- |
| | | | | 8/15/61 | 0.5-1.5 | 59 | -- | -- | -- | -- | -- |
| VA1 | Judd Ck. | 2.5 mi. S of Vashon (22/3-7L) | 4.13 | 2/2/61 | 10-15 | 44 | 12 | 0.27b/ | 5.5 | 2.6 | 2.6 |
| | | | | 8/16/61 | 1-3 | 59 | 29 | -- | 9.5 | 6.6 | 5.1 |
| VA2 | Unnamed Ck. | 2.5 mi. NW of Vashon (23/3-18N) | 2.70 | 2/2/61 | 20-30 | 44 | -- | -- | 5.0 | 2.8 | -- |
| | | | | 8/16/61 | 2-4 | 55 | -- | -- | -- | -- | -- |

a/ U.S. Geological Survey drainage area figures. All others determined by Washington State Department of Conservation, Division of Water Resources.

b/ Total iron (concentration not footnoted represents iron in solution at the time of sample collection).

c/ Measured value from records of U. S. Geological Survey.

| Parts per million | | | | | | | | | | | Specific conductance (Micromhos at 25°) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Dissolved Solids | | | | | |
| Potassium (K) | Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Phosphate ($PO_4$) | Calculated | Residue on evap. at 180°C | Hardness (as $CaCO_3$) | | | |
| 0.5 | 27 | 0 | 3.2 | 1.0 | 0.2 | 0.4 | 0.05 | 39 | 45 | 22 | 52 | 7.3 | 5 |
| 0.0 | 36 | 0 | 3.6 | 1.2 | -- | 0.1 | 0.00 | 47 | -- | 30 | 69 | 7.5 | 10 |
| -- | 24 | 0 | -- | 1.0 | -- | -- | -- | -- | 41 | 19 | 47 | 7.1 | 25 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 83 | -- | 5 |
| -- | 12 | 0 | -- | 1.0 | -- | -- | -- | -- | 26 | 8 | 23 | 6.9 | 15 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 61 | -- | 5 |
| 0.1 | 12 | 0 | 0.4 | 1.0 | 0.2 | 0.3 | 0.38 | 21 | 30 | 9 | 23 | 6.9 | 15 |
| 0.1 | 44 | 0 | 0.4 | 1.0 | -- | 0.1 | 0.05 | 55 | -- | 33 | 74 | 7.4 | 5 |
| -- | 15 | 0 | -- | 0.8 | -- | -- | -- | -- | 27 | 10 | 28 | 6.9 | 20 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 85 | -- | 5 |
| -- | 9 | 0 | -- | 0.8 | -- | -- | -- | -- | 25 | 6 | 22 | 6.7 | 15 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 65 | -- | 5 |
| -- | 25 | 0 | -- | 3.2 | -- | -- | -- | -- | 86 | 30 | 76 | 6.7 | 150 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 140 | -- | 60 |
| 1.6 | 44 | 0 | 8.0 | 3.0 | 0.3 | 4.1 | 0.18 | 75 | 98 | 45 | 105 | 7.1 | 80 |
| 1.3 | 77 | 0 | 4.6 | 2.8 | -- | 0.6 | 0.30 | 101 | -- | 64 | 140 | 7.6 | 35 |
| -- | 26 | 0 | -- | 1.8 | -- | -- | -- | -- | 53 | 22 | 59 | 7.1 | 40 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 97 | -- | 20 |
| -- | 36 | 0 | -- | 2.0 | -- | -- | -- | -- | 55 | 28 | 69 | 7.1 | 20 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 78 | -- | 10 |
| -- | 24 | 0 | -- | 1.2 | -- | -- | -- | -- | 40 | 20 | 48 | 7.3 | 20 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 76 | -- | 5 |
| 1.0 | 18 | 0 | 3.6 | 1.5 | 0.1 | 1.8 | 0.13 | 36 | 61 | 18 | 48 | 6.9 | 60 |
| 0.7 | 54 | 0 | 2.8 | 2.2 | -- | 0.7 | 0.16 | 76 | -- | 43 | 101 | 7.5 | 25 |
| -- | 20 | 0 | -- | 2.2 | -- | -- | -- | -- | 57 | 21 | 58 | 7.0 | 60 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 81 | -- | 35 |
| -- | 25 | 0 | -- | 2.0 | -- | -- | -- | -- | 63 | 23 | 59 | 6.8 | 80 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 83 | -- | 30 |
| -- | 20 | 0 | -- | 2.5 | -- | -- | -- | -- | 61 | 20 | 51 | 6.7 | 120 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 118 | -- | 40 |
| -- | 30 | 0 | -- | 2.8 | -- | -- | -- | -- | 60 | 24 | 65 | 7.1 | 70 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 94 | -- | 20 |
| -- | 14 | 0 | -- | 1.5 | -- | -- | -- | -- | 38 | 12 | 35 | 6.8 | 35 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 81 | -- | 10 |
| -- | 11 | 0 | -- | 1.2 | -- | -- | -- | -- | 28 | 8 | 26 | 6.8 | 30 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 77 | -- | 10 |
| -- | 18 | 0 | -- | 2.5 | -- | -- | -- | -- | 58 | 22 | 66 | 6.8 | 45 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 124 | -- | 35 |
| 1.4 | 16 | 0 | 12 | 3.2 | 0.3 | 3.2 | 0.08 | 51 | 61 | 24 | 72 | 6.8 | 35 |
| 1.1 | 57 | 0 | 8.6 | 3.2 | -- | 0.6 | 0.12 | 92 | -- | 50 | 118 | 7.6 | 50 |
| -- | 18 | 0 | -- | 3.0 | -- | -- | -- | -- | 59 | 24 | 70 | 7.1 | 35 |
| -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 162 | -- | 10 |

Table 57. U.S. PUBLIC HEALTH SERVICE DRINKING-WATER STANDARDS. a/

| Constituent | Maximum allowable concentration in parts per million | |
|---|---|---|
| | Mandatory | Recommended |
| Alkyl benzene sulfonate (ABS) | -- | 0.5 |
| Arsenic (As) | 0.05 | 0.01 |
| Barium (Ba) | 1.0 | -- |
| Cadmium (Cd) | 0.01 | -- |
| Carbon chloroform extract (CCE) | -- | 0.2 |
| Chloride (Cl) | -- | 250 |
| Chromium ($Cr^{+6}$) | 0.05 | -- |
| Copper (Cu) | -- | 1.0 |
| Cyanide (CN) | 0.2 | 0.01 |
| Iron (Fe) | -- | 0.30 |
| Lead (Pb) | 0.05 | -- |
| Manganese (Mn) | -- | 0.05 |
| Nitrate ($NO_3$) | -- | 45 |
| Phenols | -- | 0.001 |
| Selenium (Se) | 0.01 | -- |
| Silver (Ag) | 0.05 | -- |
| Sulfate ($SO_4$) | -- | 250 |
| Total dissolved solids | -- | 500 |
| Zinc (Zn) | -- | 5.0 |

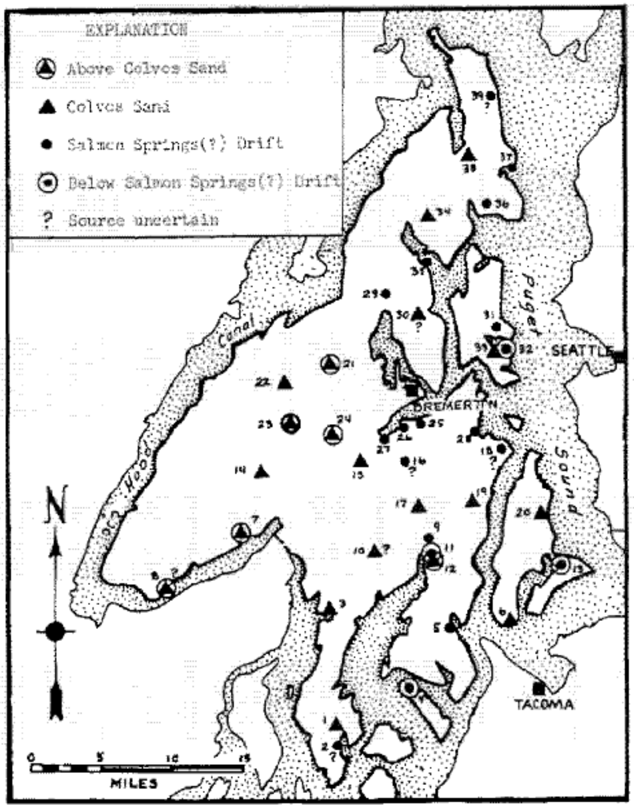


Figure 85. LOCATION OF WELLS AND SPRING SAMPLED FOR CHEMICAL ANALYSIS, AND GEOLOGIC SOURCE OF GROUND-WATER SAMPLES, (Numbers refer to list in table 55).

Table 58. U.S. PUBLIC HEALTH SERVICE RECOMMENDED UPPER CONCENTRATION LIMITS FOR FLUORIDE IN DRINKING WATER a/

| Annual Average of Maximum Daily Air Temperature (°F) | Parts per million Fluoride (F) |
|---|---|
| 50.0 - 53.7 | 1.7 |
| 53.8 - 58.3 | 1.5 |
| 58.4 - 63.8 | 1.3 |
| 63.9 - 70.6 | 1.2 |
| 70.7 - 79.2 | 1.0 |
| 79.3 - 90.5 | 0.8 |

## GROUND-WATER QUALITY

Thirty-nine ground-water sources (38 wells and one spring) on the Kitsap Peninsula and certain adjacent islands were sampled for chemical analysis (table 55). Many of the same sources were resampled 6 months later to check for variation in concentrations of chemical constituents. The sampling points are well distributed throughout the area (fig. 85). As a result, the characteristic chemical quality of ground water from the principal water-producing zones in use at the time of this study has been reasonably well defined. Furthermore, these data suggest the chemical characteristics and the problems that will be found in future search for more water.

### GENERAL CHEMICAL CHARACTERISTICS

The chemical quality of ground-water samples collected as part of this study in general can be classified as good. In most samples the dissolved-solids content is less than 150 ppm, and the principal constituents are calcium ($Ca^{+2}$), magnesium ($Mg^{+2}$), bicarbonate ($HCO_3^{-1}$), and silica ($SiO_2$) (see tables 55 and 60).

The suitability of water for industrial and domestic uses depends largely on the concentration of constituents dissolved in the water and on various properties of the water. Water quality tolerances for several industrial applications are given in Table 59. A brief discussion of several of the important constituents and properties of Kitsap Peninsula ground water follows.

### CHARACTER OF SPECIFIC CONSTITUENTS

#### SILICA

Although silica is neither physiologically significant

a/ Data after U.S. Public Health Service, 1962.

Table 59. WATER QUALITY TOLERANCES FOR INDUSTRIAL APPLICATION. Allowable limits in parts per million, except pH, color, and turbidity. a/

| Industrial Application | Silica ($SiO_2$) | Iron, manganese, or iron + manganese | Calcium (Ca) | Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Fluoride | Total solids | Hardness (as $CaCO_3$) | Alkalinity (as $CaCO_3$) | pH | Color | Turbidity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AIR CONDITIONING | -- | 0.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BAKING b/ | -- | 0.2 | -- | -- | -- | -- | -- | 4 | -- | -- | 10 | 10 |
| BOILER FEED: 0-150 psi | 40 | -- | -- | 50 | 200 | -- | -- | 75 | -- | 8.0+ | 80 | 20 |
| 150-250 psi | 20 | -- | -- | 30 | 100 | -- | -- | 40 | -- | 8.5+ | 40 | 10 |
| 250 psi & up | 5 | -- | -- | 5 | 40 | -- | -- | 8 | -- | 9.0+ | 5 | 5 |
| BREWING b/: Light beer | -- | 0.1 | 100-200 | -- | -- | 1.0 | 500 | -- | 75 | 6.5-7.0 | -- | 10 |
| CANNING b/: Legumes | -- | 0.2 | -- | -- | -- | -- | -- | 25-75 | -- | -- | -- | 10 |
| General | -- | 0.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10 |
| CARBONATED BEVERAGES b/ | -- | 0.2 | -- | -- | -- | 0.2 | 850 | 250 | 50 | -- | 10 | 2 |
| COOLING | -- | 0.5 | -- | -- | -- | -- | -- | 50 | -- | -- | -- | 50 |
| ICE (RAW WATER) b/ | 10 | 0.2 | -- | -- | -- | -- | 300 | -- | 30-50 | -- | 5 | 1-5 |
| LAUNDERING | -- | 0.2 | -- | -- | -- | -- | -- | 50 | -- | -- | -- | -- |
| PLASTICS: Clear, undercolored | -- | 0.02 | -- | -- | -- | -- | 200 | -- | -- | -- | 2 | 2 |
| PAPER PULP: Groundwood | -- | 0.5 | -- | -- | -- | -- | -- | 180 | -- | -- | 20 | 50 |
| Kraft pulp | -- | 0.1 | -- | -- | -- | -- | 300 | 100 | -- | -- | 15 | 25 |
| Soda & sulfite | -- | 0.05 | -- | -- | -- | -- | 200 | 100 | -- | -- | 10 | 15 |
| HL-Grade Light | -- | 0.05 | -- | -- | -- | -- | 200 | 50 | -- | -- | 5 | 5 |
| RAYON (VISCOSE) PULP: Production | 25 | 0.3 | -- | -- | -- | -- | 100 | 8 | 50 | -- | 5 | 5 |
| Manufacture | -- | 0.0 | -- | -- | -- | -- | -- | 55 | -- | 7.8-8.3 | -- | .3 |
| TANNING | -- | 0.2 | -- | -- | -- | -- | -- | 50-135 | 135 | 8.0 | 10-100 | 20 |
| TEXTILES: General | -- | 0.25 | -- | -- | -- | -- | -- | 20 | -- | -- | 20 | 5 |
| Dyeing | -- | 0.25 | -- | -- | -- | -- | -- | 20 | -- | -- | 5-20 | 5 |
| Wool scouring | -- | 1.0 | -- | -- | -- | -- | -- | 20 | -- | -- | 70 | -- |
| Cotton bandage | -- | 0.2 | -- | -- | -- | -- | -- | 20 | -- | -- | 5 | 5 |

a/ American Water Works Association, 1950, Water quality and treatment: Am. Water Works Assoc. Manual, 2d ed., tables 3-4, p. 66-67.

b/ Must conform with U. S. Public Health Service standards for drinking water (tables 57 and 58).

to human beings nor of importance in irrigation water, it can be a problem in industrial water supplies. For example, silica deposits can cause hot spots and rupture in boiler tubes. Also, silica deposits on blades of steam turbines affect the efficiency of the turbine. Many of the ground-water samples from the Kitsap Peninsula and certain adjacent islands contain as much as 35 to 40 ppm of silica. The higher silica concentrations of ground water in the Kitsap Peninsula correlate approximately with deeper and geologically older water-bearing zones (table 60 and fig. 86). This characteristic precludes the use of some untreated deep well water for certain industrial applications, such as boiler feed and ice production.

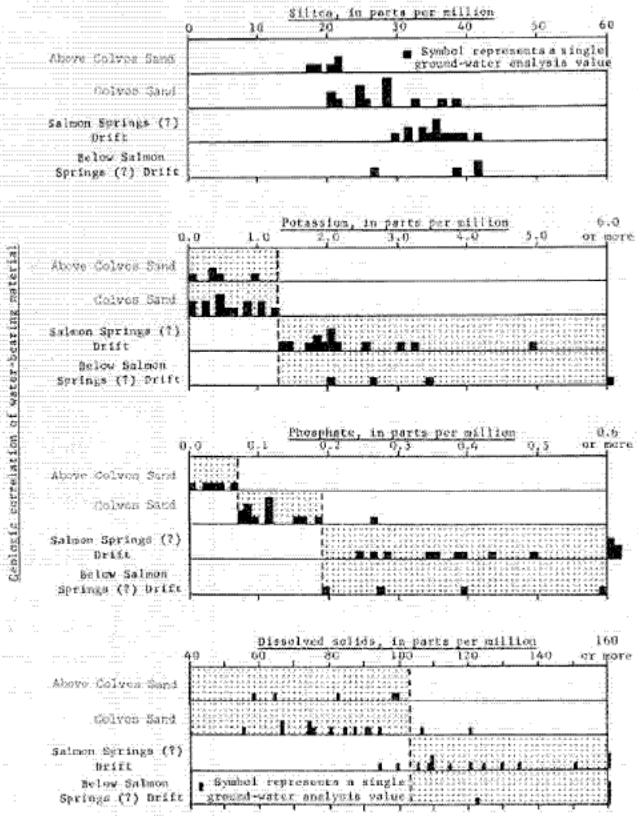


Figure 86. DISTRIBUTION OF SILICA, POTASSIUM, PHOSPHATE, AND DISSOLVED-SOLIDS CONCENTRATIONS RELATIVE TO GEOLOGIC SOURCE OF GROUND WATER OF THE KITSAP PENINSULA AND CERTAIN ADJACENT ISLANDS. Dashed vertical lines and stipped areas emphasize concentration variation between formations or groups of formations. Analyses of samples from location numbers 8 and 16 (table 55) are not included because geologic correlation of the water-bearing zones is extremely uncertain.

## IRON

Studies have shown that an appreciable quantity of ferrous iron can remain in solution when water is in an oxygen-poor environment (for example, see Hem and Cropper, 1959). The water-producing zones of many wells represent such environments. However, when the water is brought from oxygen-poor to oxygen-rich surroundings such as the atmosphere, ferrous iron is oxidized to the ferric state, which precipitates from solution as the reddish-brown precipitate ferric hydroxide, $Fe(OH)_3$ (or more correctly, $Fe_2O_3 \cdot 3H_2O$).

Three criteria determine the reliability of iron-concentration data for ground water. First, the sample must be collected directly from the well, before the iron has a chance to precipitate from solution during storage. Second, the well must be thoroughly pumped before the sample is taken, to insure that all loose rust from the tubing and well casing have been removed and that the sample represents water taken directly from the water-producing zone, not from the tubing, tank, or well casing after storage. Finally, the sample must be clear and free from sediment at the time it is obtained from the well. During the collection of several ground-water samples whose analyses appear in table 55, either one or more of the above prerequisites could not be met, and the analyses may, as a result, indicate only the general magnitude of iron concentration but not the exact value. In spite of this lack of strict control, the analyses show that several samples contain appreciable concentrations of iron and that in a few samples these concentrations not only exceed those allowable for various industrial applications, but they exceed the U.S. Public Health Service (1962) suggested upper limit of 0.30 ppm for public supply as well.

Analyses of samples from 20 of the 39 ground-water sources show iron concentrations greater than 0.10 ppm. Little consistent correlation exists between geologic formation and iron concentration, although the greatest percentage of higher iron concentrations (more than 0.10 ppm) are found in water from formations below the Colvos Sand. Only a rough correlation exists between geographic location and higher iron content. In two broad areas, however, concentrations consistently exceed 0.10 ppm (see fig. 87). The somewhat meager data suggest that within these two areas most wells, both present and future, would have similar iron concentrations.

Among the iron concentrations of more than 0.10 ppm, 10 exceed 0.30 ppm, and of these, 6 are termed "total iron" and include all forms of soluble iron plus iron extracted from material suspended in the sample. Iron concentrations for the remaining 4 ground-water samples represent iron in solution at the time of sampling and range from 0.45 to 0.62 ppm. The source wells are scattered throughout the areas of consistently high iron concentration.

## FLUORIDE

Ground water of the Kitsap Peninsula is low in fluoride content. The U.S. Public Health Service (1962), as well as many state and local health agencies, recommends about 1.0 ppm of fluoride in drinking water for children during the tooth-calcification period. Assuming an average maximum daily air temperature in the 55 to 60°F range for the Kitsap Peninsula and certain adjacent islands, the upper fluoride concentration limit for drinking water, as recommended by the U.S. Public Health Service (1962), is between 1.3 and 1.5 ppm (table 58). However, all ground-water analyses for the area of study show less than 0.4 ppm of fluoride and only three show more than 0.1 ppm.

## NITRATE

The highest nitrate concentrations are found, almost without exception, in water from shallow wells. Shallow ground water in some places is subjected to the influence of nitrate derived from organic decay or chemical fertilizer of surface or near-surface origin. The maximum nitrate concentration of the samples analyzed is 10 ppm, which is well

Table 60. CONCENTRATION AVERAGES AND RANGES FOR CONSTITUENTS AND PROPERTIES OF GROUND WATER FROM THE PRINCIPAL FORMATIONAL UNITS IN THE KITSAP PENINSULA AND ADJACENT ISLANDS, WASHINGTON. Analyses of water from sampling site numbers 8 and 16 (table 55) are not included because geologic correlation of water-bearing zones is uncertain.

| Constituent (or property) | | Water-bearing formational unit | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Above Colvos Sand | | Colvos Sand | | Salmon Springs(?) Drift | | Below Salmon Springs(?) Drift | |
| Number of samples | | 5 | | 14 | | 14 | | 4 | |
| | | Average | Range | Average | Range | Average | Range | Average | Range |
| Well depth (in feet) | | 60 | 18 - 88 | 135 | 0 - 224 | 297 a/ | 62 - 832a/ | 515 | 353 - 813 |
| Silica ($SiO_2$) | Parts per million | 19 | 17 - 21 | 26 | 20 - 38 | 35 | 29 - 41 | 36 | 26 - 41 |
| Calcium (Ca) | Parts per million | 13 | 7.0 - 22 | 8.4 | 5.5 - 11 | 17 | 9.0 - 30 | 24 | 12 - 45 |
| Magnesium (Mg) | Parts per million | 2.6 | 1.5 - 3.6 | 5.9 | 2.9 - 12 | 6.1 | 2.2 - 11 | 12 | 1.5 - 19 |
| Sodium (Na) | Parts per million | 6.4 | 2.8 - 11 | 4.6 | 3.1 - 7.5 | 8.9 | 4.6 - 20 | 22 | 10 - 43 |
| Potassium (K) | Parts per million | .4 | .0 - .9 | .5 | .0 - 1.2 | 2.3 | 1.3 - 4.9 | 3.8 | 2.0 - 7.4 |
| Bicarbonate ($HCO_3$) b/ | Parts per million | 53 | 34 - 90 | 55 | 35 - 89 | 96 | 70 - 156 | 190 | 94 - 346 |
| Sulfate ($SO_4$) | Parts per million | 5.4 | .2 - 15 | 3.8 | .0 - 20 | 3.2 | .0 - 15 | 2.0 | .3 - 6.6 |
| Chloride (Cl) | Parts per million | 4.0 | 1.2 - 9.0 | 3.1 | 1.2 - 6.2 | 4.5 | 1.2 - 22 | 5.0 | 1.5 - 8.8 |
| Nitrate ($NO_3$) | Parts per million | 2.6 | .1 - 4.9 | 2.8 | .1 - 10 | .5 | .0 - 3.4 | .2 | .1 - .5 |
| Phosphate ($PO_4$) | Parts per million | .03 | .00 - .06 | .12 | .07 - .26 | .63 | .24 - 2.0 | .36 | .19 - .59 |
| Dissolved Solids (calculated) | Parts per million | 80 | 58 - 99 | 83 | 55 - 120 | 125 | 94 - 180 | 201 | 122 - 338 |
| Hardness (as $CaCO_3$) | Parts per million | 43 | 29 - 61 | 45 | 27 - 77 | 67 | 46 - 106 | 110 | 36 - 190 |
| pH (logarithmic averages) | | 6.5 | 6.1 - 7.9 | 7.3 | 6.8 - 8.0 | 7.8 | 7.3 - 8.5 | 7.9 | 7.6 - 8.3 |

a/ Sampling site number 18 (table 55) not included because well depth is unknown.
b/ Includes carbonate ($CO_3$) calculated as $HCO_3$.

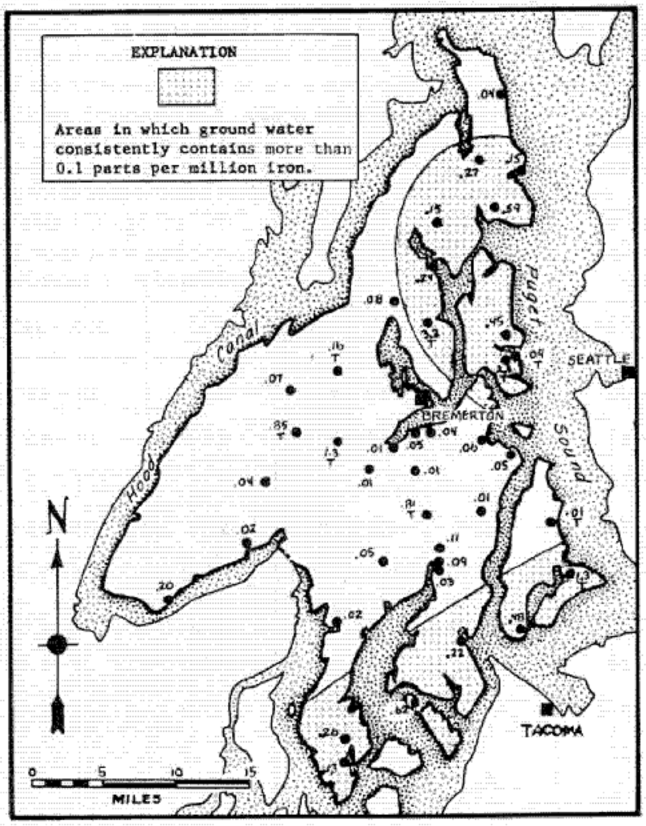


Figure 87. MAP SHOWING IRON CONCENTRATION (IN PARTS PER MILLION) OF GROUND-WATER SAMPLES FROM THE KITSAP PENINSULA AND CERTAIN ADJACENT ISLANDS. "T" below iron value indicates total iron concentration. Data from table 55.

below the recommended 45 ppm upper limit for drinking water (see U.S. Public Health Standards, table 57).

## DISSOLVED SOLIDS

Ground water of the Washington coastal region, including Kitsap County and certain adjacent areas, is characterized by a low dissolved-solids content. Only one sample (site 13), from a deep well on Maury Island, has a dissolved-solids content greater than 200 ppm, and only 19 of the 39 ground-water samples analyzed contain more than 100 ppm of dissolved solids. A definite, though by no means universal, relationship exists between depth, geologic age, and dissolved-solids content (see table 60 and fig. 86). Because several industrial water applications have a low dissolved-solids tolerance (see table 59), the depth-dissolved solids relation may become important in the future, if greater demand for water requires the utilization of deeper water-bearing zones.

## HARDNESS

On the basis of the arbitrary hardness classification discussed in the section on water quality standards (p. 149), most of the analyzed ground water samples of the Kitsap Peninsula can be considered soft (less than 60 ppm) or only moderately hard (61-120 ppm). Hardness of the water from only one well (number 13) is greater than 120 ppm.

As with dissolved solids and silica, a general relation exists between hardness of water and depth--that is, the deeper and geologically older formations often yield harder water. In the future, this relation may present problems similar to those suggested for dissolved solids.

## CHEMICAL QUALITY VARIATION WITH TIME

Table 55 shows that one-third of the initially-sampled wells were resampled for partial analyses after about 6 months. This was done to check for seasonal change in chemical and physical qualities of the ground water. A comparison of the two groups of analyses shows appreciable change in chemical quality of water from only one source during the 6-month interval. The single exception was the water from a 55-foot well (see table 55, well 8) adjacent to the Hood Canal, 20 miles southwest of Bremerton. The well was sampled first in March 1961, during a period of abundant precipitation and moderate water use, and the water was found to have dissolved-solids content of 118 ppm. The same well was sampled again in August 1961, during a dry period of intensive water use. The water then had a dissolved-solids content of 312 ppm and sodium and chloride were the principal constituents. This is clearly an example of contamination by salt water from the Hood Canal. Contamination of this type can occur where wells are adjacent to, and hydraulically connected with, the ocean or other salt water body.

Although only one occurrence of salt-water contamination is shown by the analyses in this report, data of Sceva (1957, tables 5 and 7) indicate that wells in other near-shore areas in Kitsap County are subject also to the same type of contamination. Several partial analyses taken from Sceva's report are shown in the table that follows. With one exception the wells are located near Hansville, on the northern tip of the Kitsap Peninsula. In addition, Sceva (p. 56) cites several extreme examples of contamination that involved wells in and near Winslow on Bainbridge Island.

The foregoing data suggest that almost any near-shore area on the Kitsap Peninsula and certain adjacent islands is subject to salt-water contamination. With these exceptions, however, the chemical quality of ground water can be expected to show little change, even over long periods of time.

Table 61. PARTIAL ANALYSES OF SAMPLES OF GROUND WATER PROBABLY INFLUENCED BY SALT-WATER CONTAMINATION. a/

| Well location code a/ | Depth of well, (feet below mean sea level) | Parts per million | | |
|---|---|---|---|---|
| | | Chloride (Cl) | Hardness (as $CaCO_3$) | Dissolved solids |
| 24/2-9L1 | 149 | 897 | 226 | -- |
| 28/1-12R1 | 24 | 250 | 318 | -- |
| 28/1-13A1 | 47 | 690 | 522 | -- |
| 28/2-7M2 | 154 | 98 | 224 | -- |
| 28/2-16K2 | 110 | 212 | 204 | -- |
| 28/2-22B1 | 29 | 489 | 335 | 1,230 |

a/ Data and well numbers after Sceva, 1957, tables 5 and 7, p. 95-176.

## THE RELATIONSHIP BETWEEN GEOLOGY AND CHEMICAL QUALITY

Well-drillers' records and surface geology indicate that the producing intervals of most of the sampled wells can be assigned to specific geologic formations or to a particular sequence of formations. This information and the chemical analyses can be used to determine the chemical characteristics of water from each geologic formation or group of formations. Finally, when chemical characteristics have been determined, they in turn can be used to correlate the water-bearing zones of wells for which little or no geologic information is available.

Results of the combined geologic and chemical correlations of water-bearing zones appear in table 60 and figure 86. Table 60 shows that, on the basis of average values, the concentrations of most constituents exhibit appreciable change from formation to formation. Three chemical characteristics--the concentrations of potassium and phosphate and dissolved-solids content--can be used in a general way to distinguish between groups of formations. Variations in these three items (fig 86) provide reasonable to good criteria for the separation of the Colvos Sand and younger formations from the Salmon Springs(?) Drift and older, deeper formations. In addition, a difference exists between phosphate concentrations in ground water above the Colvos Sand and in that of the Colvos Sand itself. Unfortunately, the remaining constituents have wide and overlapping spreads of values (table 60), as shown, for example, by the distribution of silica concentrations in figure 86.

A qualitative means of distinguishing ground water from the different formations is through use of a graph on which the potassium concentration of a well water is plotted against its phosphate concentration (see fig. 88). Ground water from the same formation or formations is segregated into fairly distinct groups. The graph and data similar to that of table 60, proved useful in the correlation of water-bearing zones for which no reliable geologic information was available. The resulting correlations helped to define the regional geology in some areas where well-drillers' records and surface geology were uncertain.

Reasons for the chemical variations observed in table 60 are undoubtedly many in number and complex in nature. Several generalizations can be made, however. The parallel between increased dissolved-solids concentration and increased geologic age is a common but not universal characteristic not only in the Kitsap area but in other regions as well. In general, water of the older, deeper formations has been con-

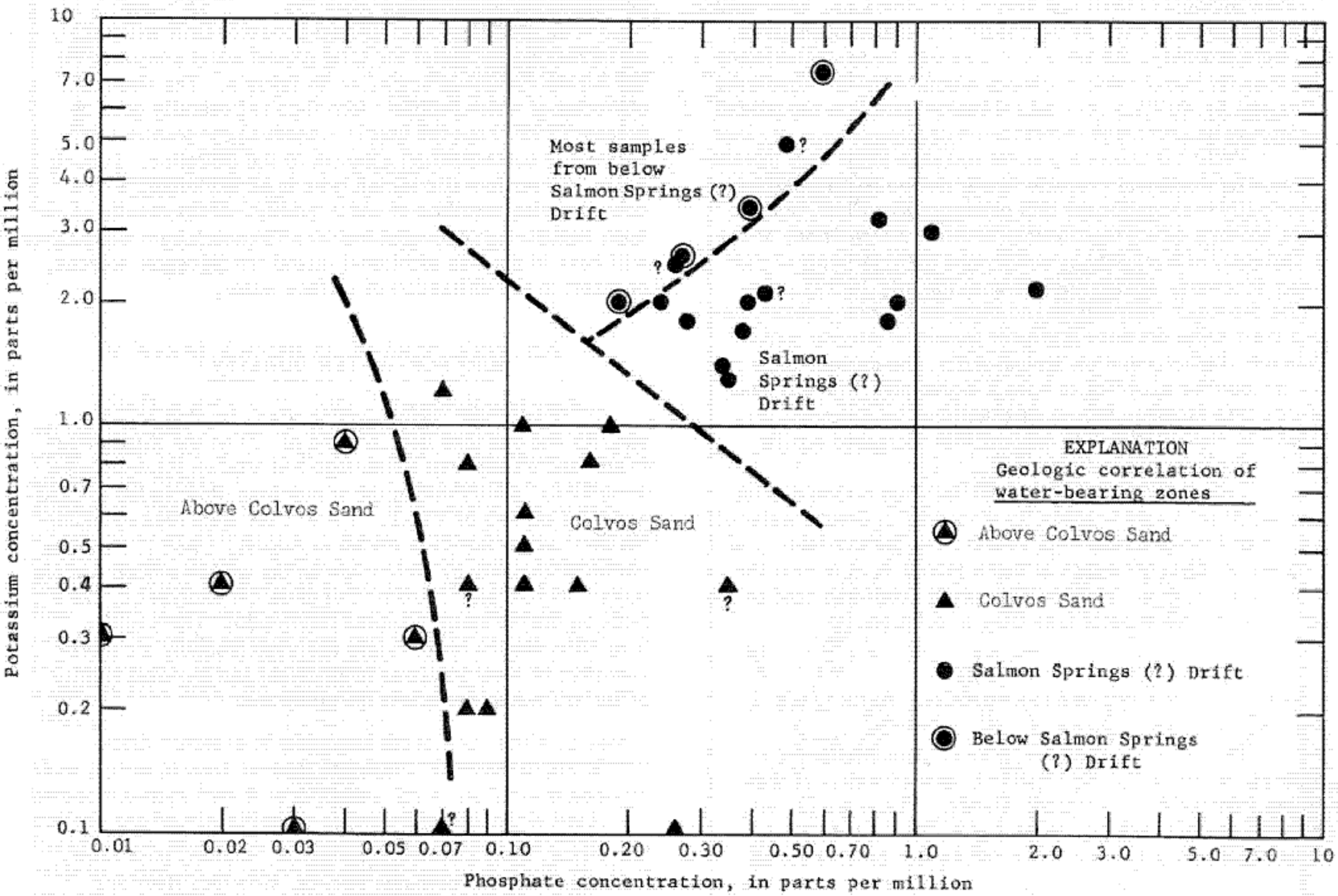


Figure 88. RELATION BETWEEN POTASSIUM CONCENTRATION, PHOSPHATE CONCENTRATION, AND WATER-BEARING FORMATION FOR GROUND WATER OF THE KITSAP PENINSULA AND CERTAIN ADJACENT ISLANDS. Query denotes doubtful formation correlation, based on insufficient geologic or chemical evidence. Data are from table 55.

fined a longer period of time within the water-bearing zones. Thus it has had a greater opportunity to dissolve the slightly soluble mineral constituents of the rock materials. Conversely, water in the shallower, generally younger formations not only has had less "residence" or contact time but also has been subjected much more to the diluting effects of water percolating downward from the surface than has the deeper water.

The marked increase in phosphate concentration with increasing depth is puzzling. The only probable mineral source of phosphate in the aquifer materials is apatite, a common but minor constituent of many igneous and metamorphic rocks. Apatite is relatively insoluble and as a result, it tends to accumulate in sedimentary materials derived from the weathering of igneous and metamorphic rocks. The sediments of the Salmon Springs(?) Drift possibly have a high accessory apatite content, thus providing a more abundant source of phosphate than the other formations.

Potassium concentrations, just as those of phosphate, are distinctly greater in water-bearing zones below the Colvos Sand and the reasons for this phenomenon are uncertain. Even though potassium is an abundant constituent of many rocks, its concentration in water generally is low because some clay minerals remove it selectively for use within their mineral structure. The greater concentrations at depth therefore suggest at least two possibilities: water-bearing zones in the Salmon Springs(?) Drift and deeper formations may have only a small amount of clay as part of their sedimentary material; or, more probably, the amount of clay may be appreciable, but the clay may already contain a high percentage of potassium and its ability to extract potassium ions from the ground water may be decreased correspondingly.

Table 60 shows a general increase in pH with increasing aquifer depth and geologic age a/. Two factors may be principally responsible for this phenomenon. First, studies have shown a direct relationship between the solution, or the dissolving, of a mineral by water, and the rise in pH of that water (Stevens, 1934; Garrels and Howard, 1959). Because the water from deeper and older formations probably has had the time to dissolve a greater amount of mineral matter than has the more shallow ground water, the deeper, older water would be expected to have a higher pH. The influence of this time factor is further substantiated by a general increase in dissolved-solids content with increased aquifer depth and geologic age (table 60).

Second, solution pH is lowered when carbon dioxide gas ($CO_2$) goes into solution (is dissolved). Ground water of older formations in general is deeper, and the availability of carbon dioxide may be less at depth than it is at or near the land surface. If so, ground-water pH at depth will tend to remain higher because of less $CO_2$ in solution.

## FUTURE GROUND-WATER QUALITY PROBLEMS

Two principal factors will be responsible for future chemical quality problems relative to ground waters of the Kitsap Peninsula and adjacent islands. These are (1) increasing use of presently-developed aquifers, and (2) attempts to develop more fully the deep water-bearing zones.

a/ The pH of a solution is a measure of its hydrogen-ion concentration, or its acidity; a low pH value indicates higher hydrogen-ion concentration and greater acidity. A pH of 7 is considered neutral, whereas a value less than 7 is termed acid, and a value greater than 7 is termed alkaline.

As demand for water increases, more water will be withdrawn from the aquifers. Not only will intensive utilization probably deplete the water-bearing zones in some areas, but also it will lead to contamination by salt water in other areas. Contamination is already a problem in some parts of the peninsula and nearby islands immediately adjacent to waters of the Puget Sound. The wells most readily affected are those that derive their water from depths in the range from sea level to roughly 200 feet below sea level. In the future, as the need for dependable water supplies increases, the areas susceptible to seawater intrusion will have to be carefully exploited. Safe pumping yields for the zones in question should be determined by hydrologic investigation, and the resulting data should be used to govern water utilization.

Deeper zones undoubtedly will be explored in an attempt to provide a sufficient quantity of water for the growing population of the Kitsap area. As shallow-producing zones such as those of the Colvos Sand and younger formations are used to their capacity, the Salmon Springs(?) Drift, and in some places even older units, may become the principal producers. Although water of the Salmon Springs(?) Drift in general is of good chemical quality, water of the older, deeper formations is, in some places, poor in quality and unsuitable for many industrial applications, without treatment. This fact, coupled with the sporadic production of these deeper zones, limits their future usefulness.

In summary, the Salmon Springs(?) Drift will supply an increasing portion of the total ground water consumed on the Kitsap Peninsula and adjacent islands. The chemical character of water from this formation is generally good at present (1962) but the unit is subject to the problems of salt-water contamination adjacent to the shoreline. In such areas, deeper formations may have to be exploited, with a corresponding sacrifice of water quality. If the results of such exploitation prove inadequate, the near-shore water users will have to develop additional inland ground-water sources, or resort to the utilization of surface water.

## SURFACE-WATER QUALITY

Twenty-one surface-water sites, located on 19 streams and one lake (fig. 89 and pl. 3) on the Kitsap Peninsula and on adjacent Bainbridge and Vashon Islands, were sampled for quality during the winter high-flow period in January and February of 1961. These sites were resampled during the summer low-flow period in August, 1961. Complete chemical analyses b/ were made on the winter-summer sample pairs from five sites, and partial chemical analyses c/ were made on the remaining samples (table 56). The samples from sites chosen for complete analyses probably are representative of areal variation in chemical and physical quality of surface water throughout the study area.

b/ Silica, iron, calcium, magnesium, sodium, potassium, bicarbonate, carbonate, sulfate, chloride, fluoride, nitrate, phosphate, dissolved solids, hardness, specific conductance, pH, and color were determined.

c/ Calcium, magnesium, bicarbonate, carbonate, chloride, dissolved solids, hardness, specific conductance, pH, and color were determined.

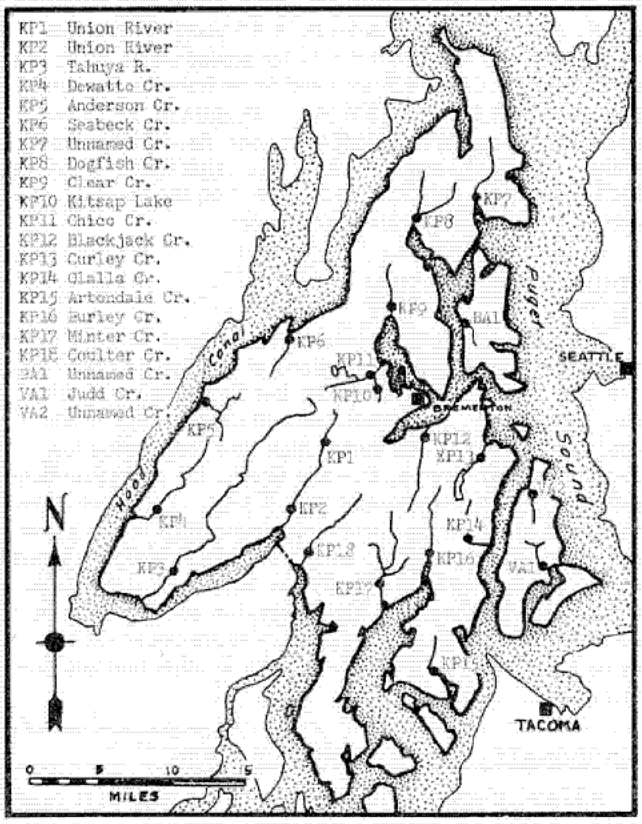


Figure 89. LOCATION OF SURFACE-WATER SAMPLING SITES.

## GENERAL CHEMICAL CHARACTERISTICS

Surface water of the Kitsap Peninsula and certain adjacent islands is similar in chemical character to ground water of the same area. Calcium ($Ca^{+2}$), magnesium ($Mg^{+2}$), bicarbonate ($HCO_3^{-1}$), and silica ($SiO_2$) are the principal constituents. However, surface water in general contains less dissolved material than ground water, especially during periods of high surface runoff. Surface water most nearly approaches the ground water in chemical character during periods of low flow. This is because ground-water sources make the principal contribution to surface flow during such periods. With few exceptions, the dissolved-solids contents of surface water are less than 100 ppm, even during the periods of low flow.

Both hardness of water and dissolved-solids content show a general west-to-east increase. Concentrations of hardness ranged from 6 to 64 ppm. Even the highest concentrations can be classified as soft or only moderately hard. Dissolved organic material, which often imparts a distinct color to water, is an important constituent of much of Kitsap Peninsula surface water during the winter high-flow period. Highest color values occur in water of the eastern part of the study area. Meager data indicate that in at least one place the concentration of iron in solution is sufficient to be bothersome. Except for organic-color and iron problems, surface water of the Kitsap Peninsula is of favorable chemical quality.

## SPECIFIC CONSTITUENTS AND PROPERTIES: THEIR SIGNIFICANCE AND SEASONAL VARIATION

### SPECIFIC CONDUCTANCE

The specific conductance of a water sample can be used as a rough measure of the dissolved-solids content of the sample--specific conductance is usually about 1-1/2 times the inorganic dissolved-solids content. Thus, specific conductance is a useful tool in the evaluation of general areal and seasonal changes in surface-water quality. For example, the specific conductances of winter (January and February) samples at the 21 surface-water sampling locations (fig.90) show a distinct increase from west to east. This increase probably is the result of dilution by greater precipitation on the generally higher, western part of the peninsula. The parallel between higher stream discharge rates and low specific conductances supports such a theory.

A comparison of winter and summer specific conductances for any particular stream shows a distinct increase in summer--in several streams 300 percent or more--and indicates the influence of more concentrated ground water during periods of little precipitation and low flow. The winter-to-summer change is more extreme in the western part of the area, where dilute precipitation runoff is an important factor during the winter.

Six winter-summer sample pairs showed only a small specific-conductance increase in the summer. Kitsap Lake at sampling site KP10 for example, showed little change. This small increase is expected, because such a body of water tends to minimize seasonal change through storage and mixing.

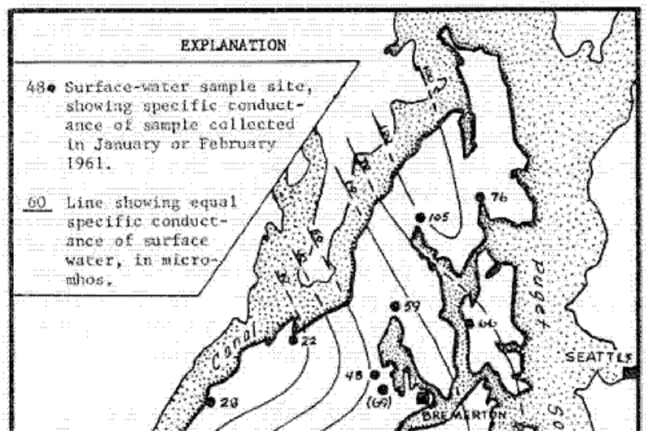


Figure 90. SPECIFIC CONDUCTANCE OF SURFACE WATER DURING JANUARY-FEBRUARY 1961. Contours apply only to land area. Data are from table 56.

The Union River at McKenna Falls (site KP1) shows a similar slight change for a similar reason. Here, the streamflow is almost entirely from a municipally-owned catchment and storage reservoir less than 1 mile upstream. Burley (site KP16), Olalla (site KP14), Curley (site KP13), and Dogfish (site KP8) Creeks all show only a moderate specific-conductance increase in the summer. Three of these sites have only a small winter-to-summer flow-rate change. These facts indicate that precipitation contributed little direct runoff to the winter streamflow at the time of sample collection, and consequently, neither quantity nor quality of flow changed much between the different times of sample collection.

## SILICA

Silica was determined on five sample pairs. One of the pairs, Union River at McKenna Falls (site KP1), shows no winter-to-summer change in silica concentration for reasons discussed in the paragraph above. The other four pairs (VA1, KP4, KP12 and KP8) show great increases in concentration. This increase can be attributed to the influence of higher-silica ground water during summer periods of little runoff.

## IRON

Iron was determined on five samples collected in the winter. The high concentrations of iron (as much as 0.45 ppm) reflect the appreciable amount of organic and inorganic sediment in the samples at the time of collection. Only the Union River at McKenna Falls (site KP1) was analyzed for iron content during low flow in August 1961. At that time the water was virtually clear, yet the iron concentration was 0.22 ppm. Furthermore, the river channel supported a rust-colored algal growth whose metabolic processes may well be dependent on iron derived from the river water.

The iron in solution may have as its source an oxygen-poor reducing enviroment on and near the bottom of the Union River reservoir, less than 1 mile upstream from the sampling site. When water containing dissolved iron is released from the reservoir it is exposed to the oxygen-rich atmosphere. Such an enviroment usually causes precipitation of almost all the iron. The fact that the Union River contained 0.22 ppm dissolved iron at a point 1 mile downstream from the reservoir suggests that some iron may well be held in solution by the complexing actions of dissolved organic material.

## CALCIUM, MAGNESIUM, AND HARDNESS OF WATER

Calcium and magnesium concentrations in surface water from the area of study are low during winter high-flow periods. Both the combined concentration of calcium and magnesium, expressed as hardness, and the amount of magnesium relative to calcium increased in a general manner from west to east. For the group of high-flow samples, calcium ranged from 2.0 ppm in Seabeck Creek (site KP6) to 9.5 ppm in Dogfish Creek (site KP8), and magnesium ranged from 0.4 ppm in Seabeck and Dewatto Creeks (sites KP6 and KP4) to 5.2 ppm in Dogfish Creek.

Calcium and magnesium concentrations of five samples collected in the summer were greater than those for samples collected at high-flow in the winter. Magnesium showed a pronounced increase from winter to summer samples. The ratio "average ppm Ca:average ppm Mg" for Dewatto, Judd, Blackjack, and Dogfish Creeks decreased from 2.4 for the winter group to 1.7 for the summer group, and the average concentration of hardness increased from 24 ppm to 48 ppm. The decrease in the ratio probably indicates the influence of ground water derived primarily from Colvos Sand. The ratio "average ppm Ca:average ppm Mg" for water of this formation is 1.4, and the average hardness is 45 ppm. These data may be compared with similar data for ground water above the Colvos Sand (5.0 and 43 ppm) and water from the Salmon Springs(?) Drift (2.8 and 67 ppm). In spite of the increase in calcium and magnesium concentrations during dry summer months, the highest measured hardness value was only 64 ppm, which by arbitrary definition (p. 149) is on the borderline between a soft and a moderately hard water.

## SODIUM AND POTASSIUM

Because of the preponderance of ground water in summer low flow, sodium concentrations of the five pairs of complete analyses were greater during low flow than during high flow. Conversely, potassium concentrations of four of the sample pairs were greater during high flow than during low flow. In the fifth source, Dewatto Creek, the potassium concentration remained unchanged at 0.1 ppm. The lower concentrations of potassium during low flow can be predicted on the basis of the low average potassium concentration in ground water of the Colvos Sand and younger formations (table 60). However, the reasons for a high potassium concentration in four of the five streams during the winter are uncertain but may be attributable to less plant growth or other biologic activity.

## BICARBONATE, SULFATE, AND CHLORIDE

The concentrations of bicarbonate, sulfate, and chloride in surface-water samples showed no unexpected variations. Concentrations of the three constituents in winter samples were lower than in summer samples, but only bicarbonate showed an appreciable increase in the summer when surface water is derived largely from spring and seep discharge, and approaches ground water in chemical character.

## NITRATE

The concentration of nitrate shows a universal winter-to-summer decrease. Greater pickup of organic decay material by winter rain runoff and the summer increase in biologic activity are probably the principal reasons for such a decrease.

## DISSOLVED SOLIDS AND WATER COLOR

Dissolved-solids content was determined by the residue-on-evaporation method on all 21 winter-collected surface-water samples. Most of these data were almost numerically equal to or greater than specific conductance data, whereas a dissolved-solids content for water normally is two-thirds to three-fourths the specific conductance. Furthermore, the calculated dissolved-solids contents for the five complete analyses were substantially less than those determined by the residue method. These data and the color data indicate that the water contains an appreciable amount of dissolved organic material. Such material generally is highly colored, whereas dissolved inorganic constituents usually impart no color to water. During the winter, the more highly colored water samples were collected from a group of streams in the eastern part of the area, where the organic material

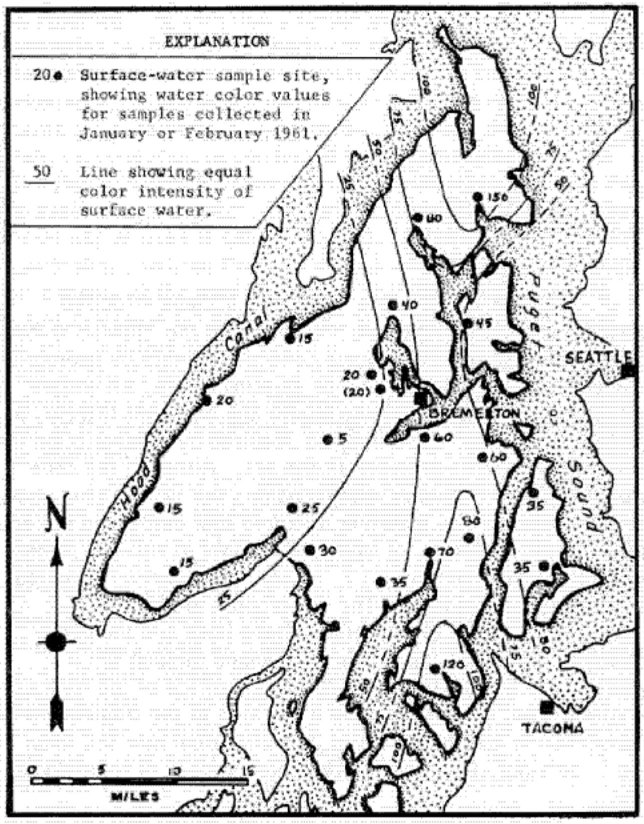


Figure 91. COLOR INTENSITY OF SURFACE WATER DURING JANUARY-FEBRUARY 1961. Contours apply only to land areas. Data are from table 56.

seems to be derived primarily from flat, and in some places marshy, pasture areas (see fig. 91). In most streams the color intensity, and presumably the organic content as well, decrease during the summer months when ground water is the principal source of stream flow.

## pH

The pH of samples collected in the winter was remarkably uniform throughout the area and ranged from 6.7 to 7.3. Of the five complete analysis pairs of winter and summer samples, the pH ranged from 6.8 to 7.3 (high flow) and 7.4 to 7.6 (low flow). The difference between the two ranges probably is the result of several factors, the principal ones being differences in biologic activity rates, higher summer water temperatures, and the greater influence of higher-pH ground water.

## FUTURE SURFACE-WATER QUALITY PROBLEMS

Beside municipal utilization of Union River water, surface streams and springs on the Kitsap Peninsula and certain adjacent islands are utilized for domestic and irrigation purposes. However, the chemical quality problems are now few in number. Concentration of iron and a stagnant odor present problems in the utilization of Union River water as a public supply. These two characteristics become objectionable only at maximum concentration and intensity in the late summer and fall. Problems similar to those of the Union River undoubtedly will be experienced if an additional public supply reservoir is constructed on Gold Creek, roughly 2 miles northwest of the present reservoir on Union River. In other areas, high color and organic content of the water are objectionable, but these properties do not require treatment at this time.

In the future, a growth of both population and industry may produce more problems, not only in the form of water quality requirements but through pollution as well. To guard against undesirable long term chemical and biological change, several of the more important streams should be monitored on at least a quarter-year basis.

# WATER USE

By M. E. Garling and G. H. Fiedler

## GENERAL

A rapid increase in water utilization has occurred in the Kitsap report area during the past few decades, primarily as a result of an accelerated population growth rate. The demand has decreased available supplies in some areas to the extent that several major surface-water sources have been closed to further appropriation. Since much of the area has undergone extensive urbanization, the trend in water use has been primarily toward development of domestic, community domestic, and municipal water supply systems. Water for irrigation, though significant, is of secondary importance in this area.

## WATER RIGHTS AND WATER LAW

Since the water use discussion which follows is based primarily on the water-right records of the Division of Water Resources, it is only proper to first present a brief description of the evolution of our Washington State Water Code and the manner in which water rights are established.

Under Article XXI of our State Constitution, it is provided that water for irrigation, mining, and manufacturing, shall be deemed a public use. The procedure for appropriating these public waters was provided soon thereafter under Chapter CXLII, Session Laws of 1891. Under this statute, rights to the use of the surface waters of the state could be acquired by posting a notice in writing at a conspicuous place at the point of intended diversion, and filing a copy of the notice with the county auditor of the county in which the notice was posted. Through compliance with the specific provisions of this act and the development and use of the waters in question, rights were established with a date of priority which related to the date of the posting of the notice. However, this procedure proved to be inadequate since no supervisory agency had been created to assure compliance with the provisions of the act. Therefore, numerous filings were made whereby the notice was posted at the intended point of diversion and a copy was filed with the local auditor but no actual diversion was made. Thus, the appropriation was never consummated and the actual right never established. However, due to the lack of records, it was not known, without considerable investigation and litigation, as to which filings had been perfected.

Through the years many conflicts arose over rights to the use of public waters and in about 1913 the governor was petitioned to compile a water code for the state. As a result, a commission was formed which drafted a code of some 44 sections which was passed into law by the legislature as Chapter 117, Laws of 1917.

Chapter 117, Laws of 1917, became effective June 6, 1917, and has become known as the Surface Water Code. This code extended the concept of rights by appropriation by declaring that subject to existing rights, all waters within the state belong to the public and any right thereto, or to the use thereof, could only be acquired by appropriation for a beneficial use as provided in the act. Although the code provided that as between appropriations the first in time shall be the first in right, it further declared that nothing in the act shall lessen, enlarge, or modify the rights of riparian owners existing as of June 6, 1917, or any right however acquired, existing as of that date. The act created the office of Hydraulic Engineer to administer these laws and the basic concept of the laws has not been changed through the 43 years of their existence. However, the office of the Hydraulic Engineer has, by law, become a division of the Department of Conservation and the duties of administration now fall upon the Supervisor, Division of Water Resources, of that department.

Since the code recognized rights which existed at the time it became effective, a procedure was established whereby the extent and priority of said rights could be determined. This procedure involves the adjudication of all rights on a certain stream or water course through a hearing in the superior court of the county in which the major part of the stream is located. Normally, the supervisor of the Division of Water Resources acts as referee, conducting the hearing and taking evidence for the court. Upon conclusion of the hearing a report is prepared by the referee whereby a schedule of rights is presented, setting forth the priority and extent of the rights of each claimant. If adopted by the court, this report then becomes a decree in the case and title to all rights on the stream are determined. It should be noted that this action is only required to establish the validity and extent of rights claimed by use prior to 1917.

Where an appropriation is to be initiated after June 6, 1917, the code provides that application must be made to the supervisor for a permit to make the appropriation and that no use or diversion of water shall be made until a permit has been issued. Applications to appropriate public waters must be submitted on forms supplied by the supervisor. When received in the office of the supervisor, the date and time of receipt is endorsed thereon and this date establishes the priority of the application. After office review of the application, a notice for publication is prepared and forwarded to the applicant together with instructions for publication. It is a statutory requirement that this notice appear once a week for two consecutive weeks in a newspaper of general circulation published in the county, or counties, in which the storage or diversion is to be made. A period of thirty days from last date of publication is then provided as a protest period during which formal objections to the approval of the application may be recorded. At this time, notice of the application is also forwarded to the State Department of Fisheries and the State Department of Game and no formal action on the application is taken until such time as the recommendations of those departments are received. Following due notice to the public, a field investigation is conducted by a representative of the Division of Water Resources to determine what water, if any, is available for appropriation and to determine to what beneficial use or uses it can be applied. After full review of the application, written findings of fact are prepared concerning all aspects of the application. If it is found that there is water available for appropriation in the proposed source of supply, and that the proposed use will not conflict with existing rights, or, threaten to prove detrimental to the public interest having due regard to the highest feasible development of the use of the waters belonging to the public, the application may be approved.

Approval of the application and issuance of permit constitutes authority for the commencement of actual construction work which will lead to use of the waters in question. For small projects it is normally specified that construction shall be started within one year from the date of issuance of permit, shall be completed in the second year, and full beneficial use of the waters shall be made in the third year. If in good faith, this schedule cannot be met, extensions of time are granted upon request. This permit may be considered as an agreement between the permittee and the supervisor for the development and use of the waters in accordance with the terms of the permit. Once the water has been put to beneficial use, the permittee may acquire a certificate of water right. However, since it is a fundamental concept of our water laws that an appropriation does not extend in a legal sense to any water except that used beneficially, the certificate of water right issues only for that quantity of water actually used and for the purposes to which the water has been beneficially applied within the maximum limits set by the permit. Should a permittee fail to comply with the conditions of the permit, he is notified by certified mail that he has sixty days in which to show cause why his permit should not be cancelled. If the permittee does not show cause, the permit is cancelled without further notice.

With issuance of the final certificate of water right, processing of the application and permit is completed. Through the certificate, title to the water in question is acquired and the actual water right is perfected. The right acquired by this appropriation becomes an appurtenance to the property described therein as the place of use with the date of priority relating to the original date of filing of the application in the office of the supervisor. Since no provision exists in the present surface water code for the revoking of such certificates, perpetual rights are established.

Whenever storage of water is contemplated, either within the stream channel or adjacent thereto, a storage permit may be required. Normally such a permit is to be obtained whenever the dam or dike will store water to a depth of ten feet or more at its deepest point, or ten acre-feet or more of water will be retained. Furthermore, the surface-water code provides that whenever it is proposed to construct any dam or controlling works for the storage of ten acre-feet or more of water, detailed plans and specifications of the structure must be submitted to the supervisor for his examination and approval as to safety before construction is started. The supervisor requires that such plans and specifications be prepared by a qualified registered professional engineer and carry his signature and seal. Applications for reservoir permit must be made on forms supplied by the supervisor and the procedure for processing of such applications is the same as described under applications for appropriation permit.

Since development and use of public ground waters of the state took place at a slower rate than the surface waters, the need for regulatory control evolved at a later date. However, with improvement of drilling techniques and the expansion of the industrial, municipal and irrigation requirements of the state, the need for laws relating to the appropriation and use of ground water became evident. In 1945 the Association of Washington Cities sponsored and assisted in drafting legislation which is now referred to as the Washington State Ground Water Code.

The laws relating to ground water supplement the surface-water code of the state and were enacted for the purpose of extending the application of the surface-water statutes to the appropriation of ground waters for beneficial use. Thus, the laws are administered by the Division of Water Resources and the appropriation procedure is essentially the same. Basically, the law provides that no withdrawal of public ground waters shall be begun, nor shall any well or works for such withdrawal be constructed unless an application to appropriate such waters has been made to the supervisor and a permit has been granted by him. However, it is further provided that for any withdrawal of public ground waters for stock water purposes, or for watering of a lawn, or of a noncommercial garden not exceeding one-half acre in area, or for single or group domestic uses, or for an industrial purpose, and in an amount not exceeding 5,000 gallons per day, a permit is not required from the supervisor. Applications may be submitted for these purposes if any person or agency wishes to record the well and the use made thereof.

In much the same manner as the surface-water code of 1917, the ground-water code recognizes existing rights established by development and use of ground waters prior to the effective date of the code, June 6, 1945. However, the ground-water code differed in that a declaratory period was provided whereby wells developed prior to 1945 could be recorded. The code provided that any person claiming a vested right for the withdrawal of public ground waters by virtue of prior beneficial use, could within three years after June 6, 1945, receive from the supervisor a certificate of ground-water right to that effect, upon declaration by the claimant in a form prescribed by the supervisor. This declaratory period was subsequently extended for a period of two years such that a total of five years was allowed in which a certificate could be acquired under declarations of claim.

Previous investigations of claims to vested surface water rights in other areas indicated, generally, that only a few of the original filings recorded in the various county auditor's offices prior to 1917 were actually developed and in present use. Since in all cases adjudication proceedings would be required to establish the extent and validity of any such claims to rights, it was decided that a lengthy search of this nature would be unwarranted for the streams included in this report.

It is probable that many instances occur in the area where diversions were initiated prior to June 6, 1917, and no recording was made with the local county auditor. However, since the 1917 act recognized all existing rights, the courts have subsequently held that if water was diverted and applied to a beneficial use prior to 1917, and the use has been continuous through the years, the use has ripened into a valid right regardless of whether or not a recording was made with the auditor. Again, adjudication proceedings would be required to quiet title to such claim to vested right.

In the consideration of all water rights, continuity of use is important. If it is found through adjudication proceedings or quiet title action that a surface-water right has not been used for a long period of time, the courts may rule that the right has been abandoned. In the event that the supervisor of water resources shall find that the withdrawal and use of ground water under a claimed or valid ground-water right has been discontinued for a period of 5 years, he may presume such rights to have been abandoned.

## WATER APPROPRIATION

A compilation of records on file with the Division of Water Resources disclosed that there were a total of 1101 active water-right filings in the report area through the year 1962 in the form of applications, permits, and certificates (see p. 166). Of the total, 966 surface-water filings were recorded for a total appropriation of 219.37 cubic feet per second and 135 ground-water filings for 17,849.55 gallons per minute or 39.77 cubic feet per second.

Total surface-water quantities appropriated in selected individual stream basins and groups of stream basins are tabulated by use in table 62. Since many streams in this tabulation are unnamed, each stream, for easier reference, is followed by its corresponding stream number in parenthesis. The stream numbering system is described in the surface-water section (page 60) and the location of each well-defined drainage is shown on plate 3. Filings on the smaller stream systems are grouped together by general geographic location and are referred to by stream numbers.

In the past it was common practice to issue surface-water rights for multiple use only in terms of the total rate of diversion. Consequently, for purposes of table 62, such total quantities were broken down into separate quantities for each use according to water duty criteria currently in effect by the Division of Water Resources. In each of these cases where a multiple use was indicated, the consumptive uses were established first in order of their priority (public and domestic, stock, irrigation and other) and the remaining quantity was assigned to non-consumptive uses. To provide a synoptic picture of table 62, the apportionment by use of all surface waters authorized for appropriation within the report area is diagramatically shown in figure 92.

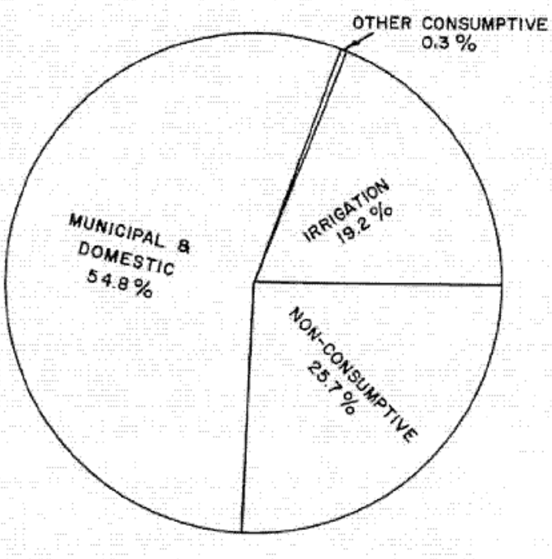


Figure 92. AUTHORIZED SURFACE-WATER USE IN STUDY AREA.
219.37 cfs = 100%

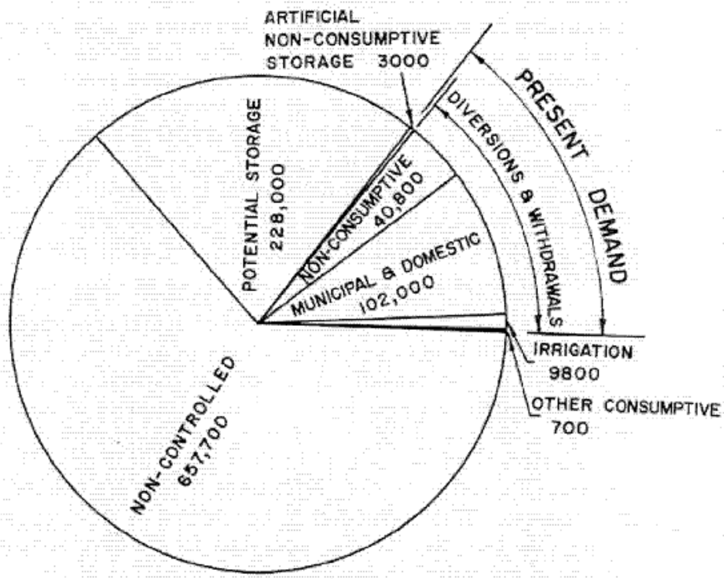


Figure 93. PRESENT AND POTENTIAL USE OF REPORT AREA MEAN ANNUAL YIELD IN ACRE-FEET PER YEAR. TOTAL ESTIMATED MEAN ANNUAL YIELD = 1,042,000 ACRE-FEET.

Using procedures discussed in the surface-water section, the land masses in the report area were estimated to yield an average of about 1,042,000 acre-feet of water per year (1946-60 data). The maximum annual consumptive demand, as established by existing surface-water and ground-water filings, amounts to about 112,500 acre-feet per year. Part of the remaining 929,500 acre-feet is used to recharge depleted soil moisture and surface-water and ground-water storage, but most of this quantity runs off into Puget Sound. As set forth in the section on water development sites, if all the sites examined were developed to their maximum potential, an additional 228,000 acre-feet of storage could be provided. In addition to large quantities of relatively unused water stored in natural lakes, there is at present approximately 3000 acre-feet of water in artifically created surface storage which is used only for non-consumptive purposes. As defined in the preceeding paragraph, filings for non-consumptive uses allow a maximum total diversion of 40,800 acre-feet of water each year. Figure 93 diagramatically shows the above quantities and how they compare with the estimated total mean annual yield. Assuming that the estimated total additional surface storage could be developed, about two-thirds of the mean annual yield or approximately 657,700 acre-feet would still remain uncontrolled.

Water use as presented in figure 93 is very general and oversimplifies a very complex set of conditions. The figure for annual yield is based upon an estimate of the mean for a specific period (1946-60) and could be expected to exhibit

Table 62. SUMMARY OF SURFACE-WATER USE.

| Drainage basin (Stream No.) | Total No. of valid filings | No. of irrigation filings | Irrigation acreage | Irrigation quantity (cfs) | Public & domestic quantity (cfs) | Other consumptive quantity (cfs) | Non-consumptive quantity (cfs) | Total appropriated quantity (cfs) |
|---|---|---|---|---|---|---|---|---|
| KITSAP PENINSULA | | | | | | | | |
| Sweetwater Creek (4) | 5 | 3 | 10 | 0.10 | 0.10 | 0 | 0.78 | 0.98 |
| Union River (7) | 67 | 25 | 228 | 2.215 | 41.025 | 0.19 | 2.18 | 45.61 |
| Mission Creek (12) | 4 | 0 | 0 | 0 | 5.03 | 0 | 0.50 | 5.53 |
| Little Mission Creek (13) | 6 | 4 | 24 | 0.31 | 0.08 | 0 | 0.09 | 0.48 |
| Johnson Creek (15) | 2 | 0 | 0 | 0 | 0.12 | 0 | 0 | 0.12 |
| Stimson Creek (18) | 1 | 0 | 0 | 0 | 0.25 | 0 | 0 | 0.25 |
| Tahuya River (44) | 10 | 3 | 47 | 0.47 | 30.04 | 0 | 1.69 | 32.20 |
| Caldervin Creek (46) | 1 | 1 | 5 | 0.05 | 0.29 | 0 | 0 | 0.34 |
| All drainages from Stream No. 1 to 60, inclusive, not listed above. | 68 | 8 | 20 | 0.31 | 2.513 | 0 | 0.59 | 3.413 |
| Dewatto Creek (70) | 2 | 2 | 32 | 0.31 | 0.02 | 0 | 0 | 0.33 |
| All drainages from Stream No. 61 to 116, inclusive, not listed above. | 16 | 4 | 13 | 0.10 | 0.72 | 0 | 0.32 | 1.14 |
| Seabeck Creek (117) | 3 | 2 | 3 | 0.03 | 0.02 | 0 | 0 | 0.05 |
| Big Beef Creek (121) | 4 | 0 | 0 | 0 | 0.06 | 0 | 5.05 | 5.11 |
| Johnson Creek (123) | 2 | 0 | 0 | 0 | 0.01 | 0 | 0.25 | 0.26 |
| Anderson Creek (124) | 1 | 1 | 15 | 0.15 | 0 | 0 | 0 | 0.15 |
| Jump-off Creek (146) | 2 | 1 | 2 | 0 | 0.01 | 0 | 0.50 | 0.51 |
| Unnamed Stream (149) | 10 | 8 | 113 | 1.19 | 0.07 | 0 | 0 | 1.26 |
| Fern Creek (150) | 4 | 3 | 2.5 | 0.03 | 0.04 | 0 | 0 | 0.07 |
| Gamble Creek (158) | 10 | 9 | 76 | 0.82 | 0.08 | 0.01 | 0 | 0.91 |
| All drainages from Stream No. 117 to 167, inclusive, not listed above. | 22 | 15 | 39.5 | 0.284 | 0.24 | 0 | 0.59 | 1.114 |
| Finland Creek (169) | 6 | 4 | 42 | 0.35 | 0.04 | 0.02 | 0.02 | 0.43 |
| Carpenter Lake Drainage (181) | 6 | 4 | 32 | 0.32 | 0.03 | 0 | 0.09 | 0.44 |
| Unnamed Stream (184) | 4 | 3 | 80 | 0.495 | 0.02 | 0.005 | 0 | 0.52 |
| Unnamed Stream (189) | 4 | 3 | 7 | 0.07 | 0.04 | 0 | 0 | 0.11 |
| Grovers Creek (192) | 7 | 7 | 31 | 0.285 | 0.05 | 0 | 0 | 0.335 |
| Unnamed Stream (202) | 4 | 3 | 21 | 0.19 | 0.03 | 0.01 | 0 | 0.23 |
| All drainages from Stream No. 168 to 206, inclusive, not listed above. | 32 | 19 | 130.5 | 1.325 | 0.537 | 0.02 | 0.15 | 2.032 |
| Dogfish Creek (207) | 26 | 20 | 259 | 2.30 | 2.48 | 0.02 | 0.10 | 4.90 |
| Johnson Creek (208) | 7 | 3 | 24 | 0.26 | 0.14 | 0.01 | 1.21 | 1.62 |
| Scandia Creek (213) | 8 | 3 | 12 | 0.12 | 1.05 | 0 | 0 | 1.17 |
| Steel Creek (223) | 16 | 8 | 105 | 0.93 | 0.08 | 0 | 0.64 | 1.65 |
| Illahee Creek (228) | 4 | 2 | 27 | 0.03 | 0.33 | 0 | 0.20 | 0.56 |
| Mosher Creek (241) | 3 | 3 | 19 | 0.15 | 0.02 | 0 | 0 | 0.17 |
| Barker Creek (245) | 12 | 9 | 98 | 0.88 | 0.07 | 0.01 | 0.68 | 1.64 |
| All drainages from Stream No. 207 to 245, inclusive, not listed above. | 42 | 17 | 73.5 | 0.84 | 1.29 | 0.02 | 0.40 | 2.55 |
| Clear Creek (246) | 8 | 6 | 78 | 0.72 | 0.05 | 0 | 0.30 | 1.07 |
| Woods Creek (251) | 9 | 1 | 1 | 0.01 | 1.74 | 0 | 0.50 | 2.25 |
| Unnamed Stream (252) | 5 | 0 | 0 | 0 | 0.48 | 0 | 0 | 0.48 |
| Chico Creek (259) | 33 | 12 | 38.75 | 0.475 | 21.03 | 0 | 0.632 | 22.137 |
| All drainages from Stream No. 246 to 267, inclusive, not listed above. | 22 | 10 | 46 | 0.40 | 0.68 | 0.11 | 4.20 | 5.39 |
| Gorst Creek (268) | 5 | 5 | 17 | 0.14 | 0.06 | 0.01 | 0.03 | 0.24 |
| Unnamed Stream (269) | 6 | 4 | 13 | 0.13 | 0.07 | 0 | 0.05 | 0.25 |
| Blackjack Creek (279) | 25 | 22 | 438.5 | 3.80 | 0.12 | 0.02 | 0.13 | 4.07 |
| Sullivan Creek (285) | 4 | 4 | 39 | 0.36 | 0.02 | 0 | 0 | 0.38 |
| Beaver Creek (289) | 6 | 2 | 9 | 0.09 | 0.04 | 0.01 | 5.12 | 5.26 |
| Curley Creek (294) | 34 | 25 | 285 | 1.99 | 0.22 | 0 | 0.92 | 3.13 |
| Wilson Creek (297) | 5 | 4 | 12 | 0.07 | 0.04 | 0 | 0.04 | 0.15 |
| All drainages from Stream No. 268 to 303, inclusive, not listed above. | 31 | 19 | 60.25 | 0.71 | 0.75 | 0 | 0.43 | 1.89 |

Table 62. SUMMARY OF SURFACE-WATER USE. (Continued)

| Drainage basin (Stream No.) | Total No. of valid filings | No. of irrigation filings | Irrigation acreage | Irrigation quantity (cfs) | Public & domestic quantity (cfs) | Other consumptive quantity (cfs) | Non-consumptive quantity (cfs) | Total appropriated quantity (cfs) |
|---|---|---|---|---|---|---|---|---|
| KITSAP PENINSULA (continued) | | | | | | | | |
| Big Phinney Creek (308) | 8 | 4 | 15 | 0.15 | 0.08 | 0.01 | 0.25 | 0.49 |
| Olalla Creek (313) | 16 | 15 | 105.5 | 1.01 | 0.04 | 0.01 | 0 | 1.06 |
| Crescent Creek (321) | 5 | 5 | 31 | 0.34 | 0.03 | 0 | 0 | 0.37 |
| Unnamed Stream (342) | 6 | 4 | 90 | 0.76 | 0.02 | 0 | 0 | 0.78 |
| McCormick Creek (350) | 5 | 2 | 52 | 0.53 | 0.13 | 0 | 0.10 | 0.76 |
| Purdy Creek (354) | 6 | 4 | 24 | 0.235 | 0.04 | 0 | 0.25 | 0.525 |
| All drainages from Stream No. 304 to 355, inclusive, not listed above. | 40 | 15 | 165 | 1.49 | 0.995 | 0.02 | 0.41 | 2.915 |
| Burley Creek (356) | 20 | 16 | 307 | 2.62 | 0.10 | 0 | 0.53 | 3.25 |
| Minter Creek (367) | 11 | 5 | 67 | 0.67 | 0.13 | 0 | 21.73 | 22.53 |
| Coulter Creek (425) | 3 | 2 | 22 | 0.14 | 0.02 | 0 | 0 | 0.16 |
| All drainages from Stream No. 356 to 426, inclusive, not listed above. | 50 | 31 | 277 | 2.92 | 0.42 | 0 | 2.75 | 6.09 |
| TOTAL - Kitsap Peninsula | 784 | 414 | 3,784 | 34.674 | 114.23 | 0.505 | 54.402 | 203.811 |
| BAINBRIDGE ISLAND | | | | | | | | |
| Unnamed Stream (461) | 7 | 7 | 87 | 0.66 | 0.01 | 0 | 0 | 0.67 |
| Unnamed Stream (463) | 6 | 6 | 91.25 | 0.93 | 0 | 0 | 0 | 0.93 |
| All drainages from Stream No. 427 to 464, inclusive, not listed above | 28 | 19 | 236.08 | 1.76 | 1.42 | 0 | 0 | 3.18 |
| TOTAL - Bainbridge Island | 41 | 32 | 414.33 | 3.35 | 1.43 | 0 | 0 | 4.78 |
| VASHON AND MAURY ISLANDS | | | | | | | | |
| Beall Creek (479) | 3 | 2 | 17.5 | 0.575 | 0.91 | 0 | 0 | 1.485 |
| Ellis Creek (482) | 2 | 1 | 1 | 0.01 | 0.51 | 0 | 0.13 | 0.65 |
| Unnamed Stream (483) | 2 | 0 | 0 | 0 | 0.51 | 0 | 0 | 0.51 |
| Judd Creek (510) | 16 | 7 | 79 | 0.73 | 0.105 | 0.05 | 0.05 | 0.935 |
| Fisher Creek (514) | 9 | 6 | 48 | 0.48 | 0.16 | 0 | 0.04 | 0.68 |
| Tahlequah Creek (518) | 5 | 0 | 0 | 0 | 0.05 | 0 | 0 | 0.05 |
| Jod Creek (530) | 3 | 3 | 24 | 0.24 | 0.03 | 0 | 0.50 | 0.77 |
| Green Valley Creek (531) | 4 | 3 | 6 | 0.17 | 0.04 | 0 | 0 | 0.21 |
| Unnamed Stream (535) | 5 | 0 | 0 | 0 | 0.09 | 0 | 0.025 | 0.115 |
| Needle Creek (540) | 6 | 4 | 16.5 | 0.535 | 0.09 | 0.005 | 0.25 | 0.88 |
| All drainages from Stream No. 465 to 547, inclusive, not listed above | 68 | 17 | 94.25 | 0.864 | 1.395 | 0.01 | 0.24 | 2.509 |
| TOTAL - Vashon and Maury Islands | 123 | 43 | 286.25 | 3.604 | 3.890 | 0.065 | 1.235 | 8.794 |
| FOX ISLAND | | | | | | | | |
| All drainages from Stream No. 548 to 555, inclusive. | 9 | 4 | 11 | 0.16 | 0.57 | 0 | 0 | 0.73 |

Table 62. SUMMARY OF SURFACE-WATER USE. (Continued)

| Drainage basin (Stream No.) | Total No. of valid filings | No. of irrigation filings | Irrigation acreage | Irrigation quantity (cfs) | Public & domestic quantity (cfs) | Other consumptive quantity (cfs) | Non-consumptive quantity (cfs) | Total appropriated quantity (cfs) |
|---|---|---|---|---|---|---|---|---|
| MCNEIL ISLAND | | | | | | | | |
| All drainages from Stream No. 556 to 559, inclusive. | 1 | 1 | 1 | 0.01 | 0.01 | 0 | 0.88 | 0.90 |
| ANDERSON ISLAND | | | | | | | | |
| Unnamed Stream (570) | 3 | 2 | 25 | 0.24 | 0.02 | 0.01 | 0 | 0.27 |
| All drainages from Stream No. 560 to 582, inclusive, not listed above. | 5 | 1 | 5 | 0.04 | 0.045 | 0 | 0 | 0.085 |
| TOTAL - Anderson Island | 8 | 3 | 30 | 0.28 | 0.065 | 0.01 | 0 | 0.355 |
| GRAND TOTAL - Report Area | 966 | 497 | 4,526.58 | 42.078 | 120.195 | 0.580 | 56.517 | 219.370 |

Table 63. ACREAGE COVERED BY GROUND-WATER AND SURFACE-WATER IRRIGATION IN THE KITSAP REPORT AREA.

| Drainage basin (Stream No.) | Ground water | Surface water | Total irrigated acreage |
|---|---|---|---|
| KITSAP PENINSULA | | | |
| Sweetwater Creek (4) | 0 | 10 | 10 |
| Union River (7) | 0 | 228 | 228 |
| Little Mission Creek (13) | 0 | 24 | 24 |
| Tahuya River (44) | 0 | 47 | 47 |
| Caldervin Creek (46) | 0 | 5 | 5 |
| All drainages from Stream No. 1 to 60, inclusive, not listed above | 0 | 20 | 20 |
| Dewatto Creek (70) | 0 | 32 | 32 |
| All drainages from Stream No. 61 to 116, inclusive, not listed above | 0 | 13 | 13 |
| Seabeck Creek (117) | 0 | 3 | 3 |
| Anderson Creek (124) | 0 | 15 | 15 |
| Jump-off Creek (146) | 0 | 2 | 2 |
| Unnamed Stream (149) | 0 | 113 | 113 |
| Fern Creek (150) | 0 | 2.5 | 2.5 |
| Gamble Creek (158) | 0 | 76 | 76 |
| All drainages from Stream No. 117 to 167, inclusive, not listed above | 1.5 | 39.5 | 41 |
| Finland Creek (169) | 0 | 42 | 42 |
| Carpenter Lake Drainage (181) | 0 | 32 | 32 |
| Unnamed Stream (184) | 0 | 80 | 80 |
| Unnamed Stream (189) | 0 | 7 | 7 |
| Grovers Creek (192) | 0 | 31 | 31 |
| Unnamed Stream (202) | 0 | 21 | 21 |
| All drainages from Stream No. 168 to 206, inclusive, not listed above | 109 | 130.5 | 239.5 |
| Dogfish Creek (207) | 45 | 259 | 304 |
| Johnson Creek (208) | 0 | 24 | 24 |
| Scandia Creek (213) | 0 | 12 | 12 |
| Steel Creek (223) | 18 | 105 | 123 |
| Illahee Creek (228) | 0 | 27 | 27 |
| Mosher Creek (241) | 0 | 19 | 19 |
| Barker Creek (245) | 15 | 98 | 113 |
| All drainages from Stream No. 207 to 245, inclusive, not listed above | 8.5 | 73.5 | 82 |
| Clear Creek (246) | 0 | 78 | 78 |
| Woods Creek (251) | 0 | 1 | 1 |
| Chico Creek (259) | 0 | 38.75 | 38.75 |
| All drainages from Stream No. 246 to 267, inclusive, not listed above | 5 | 46 | 51 |
| Gorst Creek (268) | 0 | 17 | 17 |
| Unnamed Stream (269) | 0 | 13 | 13 |
| Blackjack Creek (279) | 0 | 438.5 | 438.5 |
| Sullivan Creek (285) | 2 | 39 | 41 |
| Beaver Creek (289) | 0 | 9 | 9 |
| Curley Creek (294) | 0 | 285 | 285 |
| Wilson Creek (297) | 0 | 12 | 12 |
| All drainages from Stream No. 268 to 303 inclusive, not listed above | 2 | 60.25 | 62.25 |
| Big Phinney Creek (308) | 0 | 15 | 15 |
| Olalla Creek (313) | 0 | 105.5 | 105.5 |
| Crescent Creek (321) | 0 | 31 | 31 |
| Unnamed Stream (342) | 0 | 90 | 90 |
| McCormick Creek (350) | 0 | 52 | 52 |
| Purdy Creek (354) | 0 | 24 | 24 |
| All drainages from Stream No. 304 to 355, inclusive, not listed above | 18 | 165 | 183 |

Table 63. ACREAGE COVERED BY GROUND-WATER AND SURFACE-WATER IRRIGATION IN THE KITSAP REPORT AREA. (continued)

| Drainage basin (Stream No.) | Ground water | Surface water | Total irrigated acreage |
|---|---|---|---|
| KITSAP PENINSULA (continued) | | | |
| Burley Creek (356) | 8 | 307 | 315 |
| Minter Creek (367) | 49 | 67 | 116 |
| Coulter Creek (425) | 0 | 22 | 22 |
| All drainages from Stream No. 356 to 426, inclusive, not listed above | 18 | 277 | 295 |
| TOTAL - Kitsap Peninsula | 299 | 3,784 | 4,083 |
| BAINBRIDGE ISLAND | | | |
| Unnamed Stream (461) | 25 | 87 | 112 |
| Unnamed Stream (463) | 0 | 91.25 | 91.25 |
| All drainages from Stream No. 427 to 464, inclusive, not listed above | 0 | 236.08 | 236.08 |
| TOTAL - Bainbridge Island | 25 | 414.33 | 439.33 |
| VASHON AND MAURY ISLANDS | | | |
| Beall Creek (479) | 0 | 17.5 | 17.5 |
| Ellis Creek (482) | 0 | 1 | 1 |
| Judd Creek (510) | 0 | 79 | 79 |
| Fisher Creek (514) | 40 | 48 | 88 |
| Jod Creek (530) | 0 | 24 | 24 |
| Green Valley Creek (531) | 0 | 6 | 6 |
| Needle Creek (540) | 0 | 16.5 | 16.5 |
| All drainages from Stream No. 465 to 547, inclusive, not listed above | 24 | 94.25 | 118.25 |
| TOTAL - Vashon and Maury Islands | 64 | 286.25 | 350.25 |
| FOX ISLAND | | | |
| All drainages from Stream No. 548 to 555, inclusive | 0 | 11 | 11 |
| Mc NEIL ISLAND | | | |
| All drainages from Stream No. 556 to 559, inclusive | 0 | 1 | 1 |
| ANDERSON ISLAND | | | |
| Unnamed Stream (570) | 0 | 25 | 25 |
| All drainages from Stream No. 560 to 582, inclusive, not listed above | 0 | 5 | 5 |
| TOTAL - Anderson Island | 0 | 30 | 30 |
| GRAND TOTAL - Report Area | 388 | 4,526.58 | 4,914.58 |

variations of the order expressed by the coefficients of variation in table 49 (Variation of Measured Annual Runoff). The figure for consumptive demand assumes that the only use of water is by holders of valid water-right filings recorded with the State Division of Water Resources and that each right is being fully utilized. Also, detailed engineering, geologic and economic studies would be required for each site before the figure for potential storage could be justified. Though it is physically and economically possible to utilize some of the runoff water that is presently being lost, a large amount occurring as direct ground-water discharge to the waters of Puget Sound will always be non-recoverable. Increased utilization of ground water, however, would tend to reduce the amount of non-recoverable ground water.

Table 62 and figures 92 and 93 all show that most of the appropriated water is used for public and domestic water supplies. Additional information about municipal, community, and group water systems is provided in appendix B.

The next largest use is for irrigation. Table 63 lists by drainage basin the acreage covered by existing ground-water and surface-water rights and totals for specific portions of the report area. Other important uses are covered in the following discussions of individual basins.

In general, the need for public supplies and domestic water is dictated by local population intensity; whereas, the demand for irrigation water is significantly greater in the northern and eastern parts of the area where recharge from precipitation is least.

Individual water-right filings used in the compilation and construction of the foregoing figures and tables are found in appendices C and D. Township plats are provided in appendix E to show the location of each surface-water and ground-water filing and to show irrigated areas of 10 acres or more in size.

In the granting of water rights the Division of Water Resources recognizes and respects the needs of fish for the use of surface waters. Several aspects are considered before a permit is issued, such as fish propagation, use in fishways, and the maintenance of sufficient low flows to support fish life. The Departments of Fisheries and Game were consulted to appraise the fishery value of various streams within the study area and information was provided as to the portions of streams utilized by anadromous fish for spawning purposes. These areas are shown on plate 5. Although only the known spawning and migration areas are shown on plate 5 (in red), these streams also benefit fingerlings by providing rearing areas which have suitable food supplies. The length of residence each specie spends in fresh-water streams prior to their migration to the sea varies from about three months to a year.

The Departments of Fisheries and Game have requested that the 14 streams listed in table 64 be closed to further consumptive water-right appropriations in the interest of protection to the fishery of these streams. This closure does not apply to domestic or stock water diversions. Occasionally, streams closed for the purposes stated above may be reappraised and reopened to appropriation.

Appropriation from some streams may be permitted with certain low-flow provisions, and diversions will be restricted to periods when the flow of the streams exceeds those established low flows. In the report area, the Union River and Dogfish Creek are the only streams subject to this type of restriction and these are outlined in table 65. In addition to low-flow restrictions, Dogfish Creek is one of the streams closed to further appropriation. Streams not listed in either tables 64 or 65 are still open to appropriation.

Table 64. STREAMS CLOSED TO FURTHER APPROPRIATION.

Barker Creek - tributary Dyes Inlet
Bear Creek - tributary Burley Creek
Blackjack Creek - tributary Sinclair Inlet
Burley Creek - tributary Burley Lagoon
Clear Creek - tributary Dyes Inlet
Dogfish Creek - tributary Liberty Bay
Dutchers Creek - tributary Case Inlet
Judd Creek - tributary Quartermaster Harbor
Minter Creek - tributary Henderson Bay
Mission Creek - tributary Hood Canal
Salmonberry Creek - tributary Long Lake
Seabeck Creek - tributary Seabeck Bay
Unnamed Stream - tributary Kitsap Lake (Sec. 20, T. 24 N., R. 1 E.)
Wildcat Creek - tributary Chico Creek

Table 65. STREAMS OPEN TO APPROPRIATION, SUBJECT TO DESIGNATED LOW-FLOW RESTRICTIONS.

Union River

- Minimum flow - 3 cfs directly below McKenna Falls.
- Minimum flow - 5 cfs directly below confluence of East Fork Union River.
- Minimum flow - 8 cfs at former gaging station location near Belfair (0635) in Sec. 20, T. 23 N., R. 1 W.
- Minimum flow - 10 cfs at mouth in SW¼ Sec. 29, T. 23 N., R. 1 W.

Dogfish Creek

- Minimum flow - 0.5 cfs on East Fork above confluence with West Fork.
- Minimum flow - 1 cfs on main stem of Dogfish Creek below confluence of East and West Forks.

The following paragraphs deal with present water use in certain selected basins within the report area. These discussions, based on tables 62 and 63 and appendices C, D, and E, are intended to present only a brief resume' of use by basin. More detailed facts and figures relating to low flows have been discussed and are tabulated in the section of this report dealing with surface-water resources.

## UNION RIVER (7)

More water-right filings have been made on the Union River and its tributaries than any other stream system in the report area. As of January 1, 1963, there were 67 valid surface-water filings for a total of 45.61 cfs. Of this total, 43.43 cfs were for consumptive uses.

In accordance with the trend of water use in this area, most of the consumptive quantity (41.025 cfs) was for public and domestic water supply systems. The city of Bremerton controls nearly all of this amount for its municipal supply and has rights to divert a total of 40.00 cfs from the Union River proper, the West Fork of the Union River and Lesco Creek. In support of these diversions, the city holds two reservoir certificates to store 4000 acre-feet of water in the Union River Reservoir (Casad Dam) and 1200 acre-feet in Twin Lakes. This system was discussed in the Surface-Water Resources section under Water Development Sites.

Excepting lawn and garden irrigation of one acre or less, 2.215 cfs have been appropriated from surface-water sources in the Union River basin for the irrigation of 228 acres of land. This water is used primarily to improve pasturage during dry summer months.

A small water-wheel utilizes 1.02 cfs of the non-consumptive quantity appropriated in this basin while the remainder is primarily for fish propagation and beautification.

Since water rights have been issued for a large part of this stream's runoff, the Departments of Game and Fisheries have requested low-flow restrictions on further appropriations. These restrictions, listed in table 65, are designed to maintain certain specified minimum flows in the river at all times for the preservation of the stream's fishery resource. Though surface-water filings are numerous in the Union River basin, there are no valid ground-water filings on record with the Division of Water Resources.

## MISSION CREEK (12)

Prior to 1963 there were 4 valid surface-water filings in Mission Creek basin for a total of 5.53 cfs; however, 5.00 cfs of the total may never be put to beneficial use. The City of Bremerton, in 1950, submitted an application for this amount to augment their municipal supply, but a permit has never been issued because of protests by the Departments of Fisheries and Game. Excepting the 5.00 cfs, only 0.03 cfs have been appropriated from Mission Creek for consumptive purposes and the remaining 0.50 cfs is used for fish propagation.

In addition to existing storage in Mission and Tiger Lakes, topography in Mission Creek basin indicates that it may be possible to develop up to 9500 acre-feet of storage by constructing a dam between 2 and 3 miles upstream from the mouth of this stream (see section on Water Development Sites).

One valid ground-water filing exists within the basin. This is held by the Washington State Department of Institutions for a community domestic supply, and is limited to an annual withdrawal of 240 acre-feet.

## TAHUYA RIVER (44)

As of January 1, 1963, there were 10 valid surface-water filings on the Tahuya River and its tributaries. These filings were for a total diversion of 32.20 cfs but permits have actually been issued for only 2.20 cfs. In 1950 the City of Bremerton applied for 20.00 cfs to increase its municipal supply, but quality problems and protests by the Departments of Fisheries and Game have deterred development. Kitsap County P.U.D. No. 1 in 1960 submitted an application for 10.00 cfs from Gold Creek, but this also has drawn objections from the aforementioned State Departments.

A total of 0.47 cfs has been appropriated in the Tahuya River basin under 3 surface-water rights to irrigate 47 acres of land. Individual domestic supplies account for most of the remaining consumptive use and 1.69 cfs is used in a small mining operation.

Two reservoir applications are on file to store water in the Tahuya River basin. One was submitted in 1960 by the Kitsap County P.U.D. No. 1 and is to store 1000 acre-feet of water near the source of Gold Creek. The other was filed in 1961 to enlarge Tahuya Lake and increase its storage capacity to about 1650 acre-feet (see Section on Water Development Sites).

Ground-water resources are virtually untapped in the Tahuya River basin as no valid ground-water filings are of record.

## DEWATTO CREEK (70)

Although it is one of the larger drainages in the report area, comparatively little use is made of the water resources of Dewatto Creek basin. Only two surface-water rights have been established in this area and neither involve diversions from the main stem. In all, 0.31 cfs has been allocated for irrigation purposes and 0.02 cfs for domestic supplies.

Throughout the southwestern part of the Kitsap Peninsula there has been little ground-water development and no valid ground-water filings exist within the area drained by Dewatto Creek.

## BIG BEEF CREEK (121)

Two surface-water filings for domestic supplies account for the small total consumptive use of 0.06 cfs in this basin; however, a sizable quantity has been appropriated for non-consumptive purposes. In 1961, filings were submitted to appropriate 5.00 cfs and to store 800 acre-feet in a reservoir on Big Beef Creek near the community of Camp Union. The artificial lake created by this project would be used primarily for recreational purposes in conjunction with a lake-shore real estate development. No valid ground-water filings exist in this watershed.

## UNNAMED STREAM (149)

This stream drains the northerly end of Big Valley and is primarily utilized as a source for irrigation water. As of January 1, 1963, a total of 10 valid surface-water filings were on record, of which 8 were for irrigation use. These 8 filings permit a total diversion of 1.19 cfs to irrigate 113 acres of land. Also, 0.07 cfs has been allocated for individual domestic supplies. No ground-water rights have been established in this basin.

## GAMBLE CREEK (158)

Similar to most other streams that drain the northern part of the Kitsap Peninsula, Gamble Creek is used primarily as a source for irrigation water. Within the basin 9 valid filings have been established for this use permitting a total diversion of 0.82 cfs to irrigate 76 acres of land.

Of the 10 filings on this stream system, 5 include domestic supply as a use and permit a total of 0.08 cfs to be diverted for this purpose. Stock water accounts for an additional 0.01 cfs. One right for 0.10 cfs employs the water non-consumptively for fish propagation before it is used for domestic supply and irrigation. One ground-water right for 100 gpm has been recorded to irrigate 34 acres of land near the headwaters of Gamble Creek.

A cursory examination of the Gamble Creek basin indicates that it may be possible to construct a sizable reservoir near its mouth. Such a reservoir could help to meet the relatively high demand for irrigation water in this area.

## DOGFISH CREEK (207)

From the standpoint of water use, Dogfish Creek is probably the most important stream in the northern part of the report area. As of January 1, 1963, 26 valid surface-water filings were on record for this basin. These provide for an aggregate diversion of 4.90 cfs of which only 0.10 cfs was allocated for non-consumptive use.

The Town of Poulsbo has developed several springs in the Dogfish Creek drainage for its municipal supply and holds 3 surface-water certificates allowing a total diversion of 2.40 cfs. In addition, several individual domestic and stock-water supplies amounting to 0.10 cfs are derived from the stream system. Agriculture is well developed in this area and 20 filings for a total of 2.30 cfs were on record to irrigate 259 acres of land.

Controversies have developed in the past over the use of Dogfish Creek waters and at times the demand has been excessive. The Departments of Fisheries and Game have therefore requested that no further appropriations be authorized from this source. Existing filings are subject to low-flow restrictions (tables 64 and 65).

Three ground-water filings have been established within the area drained by Dogfish Creek. These are primarily for irrigation use and permit a total rate of withdrawal of 275 gpm to irrigate 45 acres. Domestic use is also permitted under two of the filings. The total annual withdrawal under all of the filings is limited to 95.6 acre-feet.

## JOHNSON CREEK (208)

Approximately 75 percent of the surface waters appropriated in the Johnson Creek drainage are used for non-consumptive purposes. Two rights totaling 1.03 cfs have been established for fish culture and 0.18 cfs under another right has been allocated for the operation of hydraulic rams.

Consumptive use diversions total 0.41 cfs. Three filings permit the diversion of 0.26 cfs to irrigate 47 acres, 0.14 cfs has been appropriated for domestic supplies, and 0.01 cfs is permitted for stock watering purposes. No valid ground-water filings were on record for the Johnson Creek drainage prior to 1963.

## SCANDIA CREEK (213)

Though the Scandia Creek drainage is quite small, it is important because it is the source of the domestic supply for the community of Scandia. A total of 1.00 cfs has been appropriated for this use under two separate filings by the Scandia Waterworks Co. In addition to the community system, 0.05 cfs has been appropriated for 4 individual domestic supplies.

Scandia Creek is also used to supply water for the irrigation of 12 acres of land. Three rights have been established for this purpose permitting a total diversion of 0.12 cfs.

Preliminary studies indicate that it might be possible to construct two storage reservoirs on this stream to help meet future demands in the immediate area. The reservoirs, if feasible, would have a combined capacity of approximately 220 acre-feet. As of January 1, 1963, no valid ground-water filings were on record for this basin.

## STEEL CREEK (223)

Over one-third of the water appropriated from Steel Creek and its tributaries is devoted to the non-consumptive uses of fish propagation and power production. A total of 0.64 cfs has been appropriated in 4 filings for these purposes. Of this amount, 0.49 cfs has been used under one of the rights for both fish propagation and the operation of a small water turbine. This facility reportedly produces about 2 horsepower.

A total of 1.01 cfs has been appropriated in this basin for consumptive purposes. Eight valid filings amounting to 0.93 cfs were on record for the irrigation of 105 acres of land. The remainder is utilized for domestic purposes.

Two ground-water rights have been established near the headwaters of the Steel Creek drainage. One of the rights was granted for the irrigation of 18 acres of land and both provide for domestic supplies. The combined annual withdrawal under both rights is limited to 46 acre-feet.

Topography indicates that it may be feasible to add approximately 290 acre-feet of surface storage in this basin through the construction of 2 reservoirs.

## BARKER CREEK (245)

Over one-third of all the surface waters appropriated in Barker Creek basin are utilized for non-consumptive purposes. A small ram uses 0.13 cfs to furnish domestic water for two homes and 0.55 cfs is allotted for fish propagation.

Consumptive uses from surface-water sources amount to 0.96 cfs. A total of 9 filings have been established for the irrigation of 98 acres of land and these permit a total diversion of 0.88 cfs. Of the 12 valid filings in this drainage, 7 provide for domestic supplies and stock water, and reserve a total of 0.08 cfs.

Because diversions from the Barker Creek system under existing filings have at times produced critical low flows, the Departments of Fisheries and Game have requested that this stream be closed to further consumptive appropriations.

Two ground-water filings permitting a total annual withdrawal of 43.2 acre-feet have been established in this drainage. One of these provides water for the Community of Bucklin Hill and the other is used for irrigation of 15 acres of land.

Island Lake provides natural surface storage in this basin and the reservoir on Barker Creek shown on plate 5, if feasible, would provide an additional 130 acre-feet of storage.

## CLEAR CREEK (246)

Agriculture is well developed in the Clear Creek valley; consequently, most of the water appropriated from this stream and its tributaries is used for irrigation. This use is specified in 6 of the 8 valid filings in this basin and under these rights, a total diversion of 0.72 cfs is permitted for use on 78 acres of land.

Domestic rights have been issued in this area for a total of 0.05 cfs, and 0.30 cfs is used to operate hydraulic rams.

It is estimated that about 2000 acre-feet of additional surface-water storage could be provided in this basin by constructing a reservoir on the West Branch of Clear Creek (table 54). The Departments of Fisheries and Game feel that additional diversion from the Clear Creek system would jeopardise its fishery use; therefore, the stream has been closed to further consumptive appropriation.

One ground-water right has been perfected in the southern part of this basin to furnish water for the Community of Bucklin Terrace. This right permits a rate of withdrawal of 20 gpm and a total annual withdrawal of 32 acre-feet.

## WOODS CREEK (251)

Woods Creek is a typical example of the many short spring-fed streams found on the Kitsap Peninsula but is of particular importance because it is used to provide a water supply for the Community of Silverdale. Four filings on this stream have been submitted by the Silverdale Water District for a total diversion of 1.56 cfs. Several other domestic systems also use this stream for their supplies and divert an additional 0.18 cfs. One of these filings also provides 0.01 cfs to irrigate 1 acre of land.

The only non-consumptive filing on Woods Creek is for a gravel washing operation. To prevent possible silt problems in the Community of Silverdale water system, none of the 0.50 cfs allowed for the gravel washing operation may be diverted above the Community of Silverdale intake. No ground-water rights have been established in this small drainage.

## CHICO CREEK (259)

Of the stream systems in the report area, the Chico Creek drainage ranks third in total number of surface-water filings. As of January 1, 1963, there were 33 valid filings on record for this area.

Since this stream and its tributaries flow through one of the more heavily populated areas of the Kitsap Peninsula, a major part of the appropriated water is used for domestic purposes. Municipal supply, community domestic or individual domestic use is indicated in 31 of the filings which account for a total diversion of 21.03 cfs. Though valid filings exist for this amount, permits have actually been issued for only 1.03 cfs. The Kitsap County P.U.D. No. 1 in 1960, submitted an application to divert 20.00 cfs from Lost Creek for municipal supply; however, the Departments of Fisheries and Game have registered a preliminary protest against approval of a permit.

Irrigation is specified in 12 surface-water filings in the Chico Creek basin. In all, these provide for 0.475 cfs to be diverted for use on 38.75 acres of land.

Non-consumptive uses account for 0.632 cfs. A certificate authorizing 0.25 cfs was perfected in 1938 for sand and gravel washing purposes, but a field examination in 1962 showed that the operation had ceased and no water was being diverted at that time. Two rights utilizing 0.37 cfs provide for the operation of hydraulic rams and 0.012 cfs has been allotted for fish propagation.

Future demands may require the utilization of naturally stored water in Kitsap and Wildcat Lakes and, if feasible, the 3 reservoirs examined for this area (table 54) could provide an additional 5100 acre-feet of artificial storage.

It is interesting to note that the first filing for a ground-water right under the declaration of vested right procedure was submitted from this area. This right, permitting a withdrawal rate of 70 gpm (112 acre-feet annually) for a community domestic supply, was also the only valid ground-water filing in the Chico Creek basin prior to 1963.

## GORST CREEK (268)

Though the total diversion permitted under surface-water filings in the Gorst Creek drainage amounts to only 0.24 cfs, important additional use is made of this stream by the City of Bremerton for their municipal supply under a claim to a vested right. Since Gorst Creek was used for this purpose prior to 1917, the City of Bremerton probably enjoys the highest priority right on the stream. Adjudication proceedings would be required, however, before the exact extent and priority of their vested claim could be established.

A total of 5 surface-water filings have been established by other users in this basin and all provide for irrigation, permitting a total diversion of 0.14 cfs for use on 17 acres of land. Domestic use is indicated in 4 of the rights for a total of 0.06 cfs and stockwater in 1 right for 0.01 cfs. Only 0.03 cfs has been allocated for non-consumptive use in the Gorst Creek basin. This quantity is used for power generation.

Two ground-water filings have been established in the Gorst Creek area by the Sunnyslope Water District. These rights were filed for municipal and community domestic supplies and , combined, permit a withdrawal rate of 430 gpm and a total annual withdrawal of 280.6 acre-feet.

## BLACKJACK CREEK (279)

Blackjack Creek is one of the more heavily appropriated streams in the report area, and as a result, has been closed to further appropriation at the request of the Departments of Fisheries and Game. In all, 25 valid filings have been recorded for this stream and its tributaries permitting a total diversion of 4.07 cfs.

In contrast to the general trend in the report area, irrigation is the most important water use in the Blackjack Creek drainage. A total of 22 filings have been recorded for this purpose permitting an aggregate diversion of 3.80 cfs for use on 438.5 acres of land. Individual domestic users and livestock utilize 0.14 cfs from the stream system and 0.13 cfs has been appropriated for fish propagation and operating a hydraulic ram.

Although the Blackjack Creek basin is a comparatively good ground-water producing area, only two ground-water rights have been perfected in this area. These rights are for community domestic supplies and permit a total rate of withdrawal of 70 gpm and a total annual withdrawal of 28.75 acre-feet.

In addition to the natural surface storage provided by several small lakes, cursory studies indicate that it may be possible to develop up to 2050 acre-feet of storage through the two proposed reservoirs listed in table 54.

## CURLEY CREEK (294)

Curley Creek basin ranks second among individual drainages in the report area in total number of valid surface-water filings. As of January 1, 1963, there were 34 such filings on record for this basin.

Similar to Blackjack Creek basin, agriculture is well developed in the Curley Creek area and most of the larger appropriations are for irrigation purposes. In all, 25 filings provide for a total diversion of 1.99 cfs to be used on 285 acres of land. Filings for domestic use permit a total diversion of 0.22 cfs, and diversion of 0.92 cfs is permitted for several non-consumptive uses.

Long Lake, with a surface area of 314 acres, is the largest natural lake in the report area. In addition to the surface water stored in Long Lake, it may be possible to develop 190 acre-feet of storage on a small tributary stream near the mouth of Curley Creek.

Two ground-water filings have been established in this basin for community domestic and municipal supplies. The combined rate of withdrawal permitted by these filings is 350 gpm and the total annual withdrawal is 571.4 acre-feet.

## OLALLA CREEK (313)

The trend in water use found in other nearby drainages is also displayed in the Olalla Creek basin. A total of 16 surface-water filings have been recorded for this area and, of these, 15 include irrigation as a use. Six of the rights provide for irrigation of 10 acres or more, and allow a total appropriation of 1.01 cfs for use on 105.5 acres of land.

Three rights on streams in this drainage allow a total diversion of 0.04 cfs for domestic purposes and 0.01 cfs has been allocated for stock water use. No ground-water filings or non-consumptive surface-water filings exist in this basin.

## BURLEY CREEK (356)

A total of 2.62 cfs has been appropriated under 16 filings to irrigate 307 acres of land in the Burley Creek basin. Only in the Blackjack Creek drainage has more surface-water been appropriated for this use. Of the 20 valid filings for the Burley Creek drainage, 9 provide for domestic use and permit a total diversion of 0.10 cfs. Since these filings permit a comparatively heavy draft on the surface-water resources, the Departments of Fisheries and Game have requested that Burley Creek be closed to further consumptive appropriation.

Non-consumptive uses account for 0.53 cfs of the total 3.25 cfs diversion allowed in the basin. These include 0.10 cfs for milk cooling operations, 0.08 cfs for fish propagation, and 0.35 cfs for the operation of hydraulic rams.

Two ground-water rights have been perfected in this area. One permits the use of 50 gpm for a gravel washing operation and is limited to a total annual withdrawal of 20 acre-feet. The other allows 45 gpm to be used for irrigation and domestic purposes and provides for a maximum annual withdrawal of 160 acre-feet.

## MINTER CREEK (367)

The State Department of Fisheries maintains a fish hatchery and biological experiment station near the mouth of Minter Creek and holds rights for the use of 20.48 cfs. This quantity is utilized primarily for non-consumptive purposes, which include fish culture and propagation, scientific studies of fish and other marine life, and the operation of fish counting traps. Two other non-consumptive filings in the basin authorize 1.25 cfs for gravel and rock washing operations, and fish propagation.

Within the basin, 5 surface-water rights have been issued for irrigation purposes. These rights utilize a total diversion of 0.67 cfs for 67 acres of land. Domestic use is specified in 8 of the 11 surface-water filings in this area permitting a total diversion of 0.13 cfs. To insure that flows will be sufficient at all times to operate their hatchery, the Department of Fisheries has requested that Minter Creek and its tributaries be closed to further consumptive appropriation.

Prior to 1963, there were 4 ground-water filings in the watershed for community domestic, domestic and irrigation uses. The combined rate of withdrawal under these filings is 471 gpm and 117.6 acre-feet per year.

Small amounts of natural surface storage exist in several small lakes in the basin and preliminary studies indicate that approximately 2800 acre-feet of storage could be added by constructing a dam on the main stem of Minter Creek about a mile west of Horseshoe Lake (pl. 5).

## JUDD CREEK (510)

Appropriations from Judd Creek and its tributaries present a fairly representative picture of water use in the island areas of this report. A total of 16 surface-water filings have been recorded for this stream system, which combined, permit the diversion of 0.935 cfs.

Irrigation is specified in 7 of the filings, allowing a total of 0.73 cfs to be diverted for use on 79 acres of land. Domestic supplies and stock water account for 0.155 cfs. A non-consumptive diversion of 0.05 cfs is specified in one right to operate a hydraulic ram.

Because Judd Creek has some fishery value, the Departments of Fisheries and Game have requested that future appropriations be restricted to domestic and stock water use, and non-consumptive uses. No ground-water rights have been established in this area.

# SUMMARY

## CONCLUSIONS

In accordance with established standards, the Kitsap Peninsula and nearby islands can be classified as being a moderately to heavily watered area with a "sub-humid" to "humid" climate. The report area in general, however, is relatively dry when compared to the "humid" and "very wet" climate experienced in most of western Washington. Lying in the lee of the Olympic Mountains, much of the study area is shielded from the full effect of prevailing storms. The most northerly part receives the least precipitation, averaging about 26 inches annually, while farther south, at higher elevations and where the rain-shadow effect is diminished, annual precipitation averages as much as 80 inches. Although the areal distribution of precipitation varies considerably over the report area, the entire region is usually affected to some degree by passing storms and the climate is quite consistent from year to year.

Temperatures reflect the moderating maritime influence of Puget Sound waters and the Pacific Ocean. The warmest month is usually July or August during which temperatures seldom average much above 70° F. The coldest month is January when temperatures usually average slightly below 40° F.

Storm activity is generally greatest during the months of November, December, January and February and normally reaches a minimum in July. In the northern part of the study area about 75 percent of the annual precipitation occurs during the 7-month period, October through April, and in the southern part, approximately 85 percent is received during this period. The seasonal cyclic variation in precipitation is usually quite smooth except for the month of June when the trend is broken by an anomalous increase. This increase is most noticeable in the areas of least annual precipitation.

Long-term precipitation trends in the report area also display a cyclic variation. Ten-year moving-average graphs indicated annual precipitation was generally lower than normal for several years during the late 1920's and again in the early 1940's while other groups of years during the period 1908-62 tended to be above normal.

Climatological records of the five stations within the report area were inadequate to define the areal distribution of precipitation for the entire area. A basically accurate isohyetal analysis was possible, however, by utilizing these data in conjunction with streamflow records and other climatological data collected at stations located outside but near the periphery of the study area. Before a more refined analysis could be accomplished, it would be necessary to expand and increase the density of the present hydrologic data collection network.

Water budget analyses for the study area by the Thornthwaite procedure (p. 12) show that there is normally insufficient precipitation to meet the potential demands of evaporation and transpiration during most of the summer months. In the southern part of the report area a deficiency usually exists during the months of May through September. To the north, this period of deficiency increases and in the most northerly parts of the study area it usually starts around the end of May and often lasts well into October.

The extent of the summer water deficit is also influenced by the water retention capabilities of the soil. Where soils exhibit a large water holding capacity in the root zone, the deficit is slight, but in places where the soil water retention capability is 2 inches or less, the summer deficit may average as much as 10 to 12 inches of water.

Geologically, the Kitsap Peninsula and adjacent islands are underlain primarily by unconsolidated Pleistocene sediments, with Tertiary volcanic and sedimentary rocks being exposed only along the shoreline areas north and east of Bremerton and in the Green Mountain-Gold Mountain hills west of Bremerton. The Pleistocene materials consist of strata of sand, gravel, clay and till of glacial derivation, and interbeds of peat-bearing silt and clay deposited during interglacial periods. Where saturated below the regional water table, the sand and gravel strata form the aquifers which provide the ground-water supply in the study area.

The aquifers are recharged annually by percolation of seasonal precipitation to the water table. The amount of such recharge is sufficient in most parts of the report area to provide adequate ground-water supplies to meet the present requirements of individual household and community systems. In the heavily populated areas of Port Orchard, Winslow and Gig Harbor, municipal supply wells produce satisfactorily for current demands, and several deep, high capacity wells on the south shore of Sinclair Inlet serve as a supplemental supply for the growing requirements of the City of Bremerton. However, as the amount of natural recharge to aquifers varies with precipitation, aquifers underlying the relatively drier northeasterly parts of the Peninsula may not be sufficiently recharged to allow a sustained perennial yield in the event of large increases in future withdrawals.

In sparsely populated parts of the study area development of ground-water supplies has been insufficient to determine the potential of underlying aquifers. Certain other areas experience a shortage of available ground water owing to unfavorable geologic and topographic conditions. In areas where the dense, impermeable Tertiary volcanic and sedimentary rocks are present ground water supplies are noticeably restricted and wells penetrating these formations will barely furnish enough water for individual domestic needs. On the smaller islands and minor peninsulas, the storage capacity of underlying aquifers is normally small and over-drafting of ground water in such areas could result in saline contamination.

With respect to surface water, the network of 18 continuous-record stream gaging stations on the Kitsap Peninsula represents a relatively high average sampling density of 1 station for every 37 square miles. However, most of these stations were concentrated on streams draining the Green Mountain-Gold Mountain area and runoff has actually been measured from only 23 percent of the total land area included in this study. As a result of the unequal station distribution, streamflow and runoff conditions in the densely gaged area are quite accurately delineated, but less confidence should be placed in the results of analyses for other parts of the report area, especially where continuous-record streamflow data are completely lacking.

In general the study indicated that the mean annual water yield of all lands included in the report, during the period 1946-60, was about 1,042,000 acre-feet, or an equivalent water depth of 29.25 inches over the report area. The variability of annual runoff was found to be slightly greater than that of annual precipitation; however, the annual production of both precipitation and runoff in this area is very consistent and reliable.

Since elevations and temperatures in the Kitsap Peninsula area are not conducive to the accumulation of large snow packs, this factor has little influence on the streamflow regimen and most streams closely follow the seasonal variation of precipitation. The highest peak flows usually occur in the months of November, December, January or February, and the lowest flows normally occur in August or September, or in certain exceptional cases as early as July or as late as October.

Although runoff and streamflow are primarily controlled by the areal and time distribution of precipitation, runoff processes in this area are also influenced to a large extent by the permeability and structure of underlying rock materials. The larger streams are generally effluent (ground water contributes to streamflow); however, widely varying permeabilities of the glacial and alluvial materials, together with seasonal water-table fluctuations, cause some streams to become influent and occasionally intermittent along certain reaches of their channels. Although topography determines the direction of surface runoff, the direction of ground-water movement in the report area is commonly independent of surface features and is mainly controlled by the physical and hydraulic characteristics of the aquifers. Such control by aquifers can permit appreciable quantities of ground water to migrate from one basin to another, especially where the aquifers are large and continuous beneath surface-drainage divides. Evidence of such inter-basin ground-water transfer was found between the Tahuya River and Dewatto Creek basins, Thomas Creek and adjacent drainages, Dogfish Creek and adjacent basins, Burley Creek and Minter Creek basins, and many smaller streams that drain peripheral areas of the peninsula and islands. Intensive field investigation and more data would be required, however, before a more quantitative analysis could be made of these processes.

Instead of the usual drainage pattern where tributaries converge to form a single major river, on the Kitsap Peninsula and adjacent islands most streams tend to radiate out from the upland areas in many diverging systems and few large rivers have evolved. As a result, before appreciable quantities of surface water can be developed and utilized, it would be necessary to construct storage reservoirs or other collection facilities.

The chemical quality of both surface and ground waters in most parts of the Kitsap Peninsula area can be classified as good and suitable for municipal and most industrial uses. The quality of surface water is similar to that of ground water, although surface waters exhibit a seasonal variation in the concentration of chemical constituents, owing to the effects of dilution during periods of high flow. Also, in those areas of greater precipitation, such as the higher parts of the western upland, the greater degree of dilution keeps concentrations low, while in the easterly and northerly parts of the study area mineral concentrations are highest. In some watersheds, such as the Union River basin, iron concentration, organic coloration, and stagnant odor creates a slight problem during late summer and fall months.

Ground water in deeper, geologically older, aquifers has generally a higher mineral concentration which would require treatment for certain industrial applications. Iron and silica concentration is usually higher in deeper aquifers, below the Colvos Sand. Geographically, iron concentrations are consistently greater than 0.10 part per million in the northern and central uplands and on Bainbridge Island, and in the southerly parts of the Longbranch peninsula, Gig Harbor peninsula and Vashon and Maury Islands. Nitrate concentration is usually highest in shallow wells due to local contamination by decayed organic materials and fertilizers. The maximum concentration of nitrate, however, is still considerably below the standard limit set for drinking water by the U. S. Public Health Service. Along some shoreline areas, particularly in the Hansville area of the northern upland and in the Winslow area of Bainbridge Island, slight saline contamination was detected.

One result of the chemical studies of ground water was the indication that different geologic formations yielded water of different quality. The tests suggest that, where other information is lacking to determine underlying geologic formations, chemical analyses of water from various depths might lead to an interpretation of the underlying stratigraphy.

In considering water use, the basic and most difficult problem encountered in the Kitsap Peninsula area is the completely out-of-phase occurrence of the supply with respect to the demand. Natural consumptive uses, expressed in terms of evapotranspiration, are greatest in summer when the supply, provided by precipitation, is least. Also, the needs of man reach a maximum in summer when the area's population is increased by resort trade and when irrigation demands are greatest. Additional storage facilities, which would capture some of the surplus winter runoff waters for use during the summer deficit period, could help to offset some of the imbalance. However, if the area as a whole experiences a large increase in population and/or industrial growth, requiring additional large supplies of good quality water, it might be necessary to go to areas outside the Kitsap Peninsula and import water from stream systems which have major uncommitted supplies. The most probable sources for this purpose are the larger streams draining the eastern slopes of the Olympic Mountains.

In general, the water-use inventory has shown that people in the report area are quite conscious of protecting their water needs. The total number of active water-right filings, 1101,(966 for surface water and 135 for ground water) was approximately 5 percent of all the active filings on record with the Division of Water Resources at the end of the year 1962. The maximum annual consumptive water demand of 112,500 acre-feet under these filings represents only about 11 percent of the estimated average annual yield of the area. If feasible, potential surface storage developments in the area could augment the total supply to about 30 percent of the mean annual yield. No estimates were made of the safe sustaining ground-water yield but existing developments in most areas have barely tapped this part of the resource.

## RECOMMENDATIONS

It has been concluded from the inventory that water supplies in most parts of the report area are adequate to meet present needs. However, with the anticipated growth of the area, it may soon become necessary to enlarge existing systems and develope new sources of supply. To help insure optimum benefits from the resource, it is strongly recommended that water-resource study committees be created at both county and local levels. Such committees could represent the interests of local people and could meet with appropriate private, municipal, county, state, federal and other public agencies in planning and coordinating a logical and orderly program of water-resource development.

It is acknowledged that the foregoing inventory is only a start toward complete understanding of hydrologic processes in the Kitsap Peninsula area. The study disclosed many deficiencies in basic data and indicated various areas where more information is needed. Therefore, to enhance future water-resource investigations and to assist those who will be entrusted with the responsibility of managing and developing the area's water resources, the authors offer the following specific recommendations:

A. Studies of precipitation and climate in the report area indicated that existing climatological data were only adequate to present a general picture of conditions. Consequently, prior to any future comprehensive hydrologic studies of this area, it is recommended that the establishment of additional climatic stations be considered for the following general locations:

1. Hansville or Port Gamble
2. Bangor
3. Suquamish or Indianola
4. Poulsbo or Keyport
5. Seabeck
6. Silverdale
7. Winslow
8. Holly (1 or 2 miles southeast)
9. Camp Union or Hintzville
10. Gold Mountain lookout
11. Dewatto (1 mile south)
12. Belfair
13. Mission Lake
14. Square Lake
15. Burley or Purdy
16. Vashon
17. Tahuya (1 or 2 miles northwest)
18. Artondale (1 mile southwest)
19. Longbranch (1 mile west)

If for economy or other reasons it is necessary to limit the period of data collection at any of the selected locations, the period of operation should be chosen so as many stations as possible will have simultaneous periods of record. Also the period of operation should be coincident with that of any stream gaging program selected, if possible.

B. In conjunction with the above program for obtaining additional climatological data, it is recommended that simultaneous collection of continuous record streamflow data be considered for the indicated general locations on the following streams:

*1. Tahuya River above tidewater
2. Rendsland Creek above tidewater
3. Anderson Creek near Holly above tidewater
4. Stavis Creek above tidewater
5. Seabeck Creek above tidewater
*6. Big Beef Creek above tidewater
7. Anderson Creek near Bangor above tidewater
8. Unnamed stream No. 149 near Lofall above tidewater
9. Gamble Creek above tidewater
10. Unnamed stream No. 166 near Hansville above tidewater
11. Silver Creek at Eglon above tidewater
12. Grovers Creek above tidewater
13. Steel Creek above tidewater
14. Barker Creek above tidewater
*15. Clear Creek above tidewater
16. Lost Creek above confluence with Chico Creek
17. Gorst Creek above City of Bremerton diversion
18. Curley Creek above tidewater
19. Olalla Creek above tidewater
20. Crescent Creek above tidewater
21. Artondale Creek above tidewater
22. Purdy Creek above tidewater
23. Unnamed stream No. 385 at Longbranch above tidewater
24. Rocky Creek above tidewater
*25. Coulter Creek above tidewater
26. Unnamed stream No. 463 on Bainbridge Island above tidewater
27. Judd Creek on Vashon Island above tidewater
28. Fisher Creek on Vashon Island above tidewater
29. Needle Creek on Vashon Island above tidewater
30. Unnamed stream No. 569 on Anderson Island above tidewater

Should such a program be initiated, in whole or in part, it is suggested that, as a minimum, no less than 3 and preferably 5 water-years of record be obtained concurrently at each station. The actual length of period should be based upon the requirements of the program and other needs of the specific location. In addition, it is recommended that the locations marked with an asterisk (*) be considered for long-term data collection sites. During such a program it would be desirable to obtain additional data at the sites of some of the discontinued gaging stations in the area. To permit more thorough analyses, miscellaneous flow measurements should also be made during the same period at locations indicated in Table 11 where no continuous records have been collected.

C. In analyzing streamflow data collected in the report area, a more thorough investigation should be made of the effects of geologic conditions on ground-water movement and base flow.

D. Since actual water use in the area, as opposed to potential use expressed by water-right filings, is presently unknown, any further analyses of the resource should at least provide for an examination and measurement of major water diversions, consumptive use and return flow during the period of study.

E. To more completely evaluate the ground-water resources of the Kitsap Peninsula area it will be necessary to conduct a more detailed geologic study than that encompassed in the present report. Particularly in those areas undergoing rapid residential development and where future municipal and industrial growth is anticipated, it is recommended that a more thorough study be made of underlying water-bearing formations. In order to determine, both quantitatively and qualitatively, the character of the major aquifers and extent and direction of ground-water movement it will be necessary to initiate a program that will include compilation of data on existing wells in the area and additional research on underlying geology by test drilling, and geophysical methods. Such a program should incorporate the following:

1. A canvass of existing sources of ground-water withdrawal in the area under study. This should include a tabulation of representative wells and major spring zones supplied by aquifers at various depths and locations. The canvass should record such pertinent information as:

   a. Location and elevation of well or spring
   b. Flow of spring, with date of measurement
   c. Observed geologic character of spring zone
   d. Depth and diameter of well and well casing
   e. Driller's log of materials penetrated
   f. Depth and thickness of water-bearing zones
   g. Static water level, measured periodically, if possible
   h. Pump test of well (yield in g.p.m., rate of of drawdown and recovery of water level)
   i. Type and size of pump
   j. Chemical analyses and temperature of water samples
   k. Present use of well
   l. Previous history of well use, changes in yield

2. Establishment of a network of observation wells to provide continuous-record information on ground-water conditions in all parts of the report area. If possible, these wells should be representative of different depth aquifers at each selected location. Shoreline wells should be included to provide data on the extent of local or widespread saline contamination. For each well selected, water-level measurements should be obtained at least on a monthly basis, and chemical analyses at least on a quarterly-year basis, for a period of not less than 5 years.

3. In areas where present ground-water development has been insufficient to provide complete and reliable information, a test drilling program should be conducted to determine the character of underlying geology and the extent of water-bearing formations. Such a program could be supplemented by geophysical investigations to aid in interpreting subsurface features.

F. To provide for future increases in the water demand, the feasibility of potential storage sites suggested in this report should be more thoroughly investigated. Those sites that appear to be most desirable should be completely examined from a geologic, engineering and economic standpoint. Then, to keep development costs to a minimum, it would be prudent to obtain control, as soon as possible, of all lands involved in projects that will be initiated in the foreseeable future.

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# APPENDIX

## APPENDIX A

### Drillers' Logs

Appendix A lists drillers' logs of all wells used as the basis for construction of the diagrammatic geologic sections shown on Plate 1. Drillers' logs have been modified in some cases to incorporate into larger units two or more strata of lithologically similar materials. The wells are tabulated in order of their positions within west-to-east sections A-A' through L-L' and within south-to north section M-M'-M". Where a well appears in both west-to-east and south-to-north sections, it is tabulated with the former.

Information tabulated includes well number (see Fig. 9), name of owner or tenant, approximate altitude in feet above mean sea level, name of driller if known, depth in feet and diameter in inches, SWL (static water level in feet), Dd (drawdown of water level in feet), yield in gallons per minute (gpm), depth of water-bearing materials, description and thickness of materials penetrated by driller, results of chemical analyses in parts per million (ppm), and miscellaneous pertinent data.

# APPENDIX A

## DRILLERS' LOGS

### SECTION A-A'

28/2E-7M: (b) (6) Altitude 15 feet. Drilled by M. F. Ragsdale. Cased 169' x 6". Chloride: 98 ppm; Hardness ($CaCO_3$): 224 ppm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and peat | 25 | 25 |
| sand, clay, water-bearing, with some gas | 144 | 169 |
| clay, hard | | at 169 |

28/2E-18J: (b) (6) Formerly Puget Mill Co. test well. Altitude 60 feet. 206' x (?)". Yielded some gas.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay, buff, sandy | 15 | 15 |
| sand, gray-buff, clayey | 40 | 55 |
| clay, gray, sandy, water reported at 67 feet | 21 | 76 |
| sand, gray, fine to coarse, gravel at base | 51 | 127 |
| clay, gray, silty to sandy | 31 | 158 |
| gravel and gray clay | 16 | 174 |
| clay, gray, silty, some gravel at 180 feet, yields some gas at 190-203 feet | 32 | 206 |

28/2E-17M: Evergreen Gas and Oil Co. Altitude 65 feet. Drilled in 1940 as oil and gas test well.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and clay, many alternating strata, water-bearing sand 12-33 feet | 35 | 35 |
| sand, water-bearing | 133 | 168 |
| sand and clay, alternating strata | 30 | 198 |
| sand and "clay shale" | 38 | 236 |
| sand and clay, alternating strata, water-bearing sand 238-273 feet and 288-302 feet | 86 | 312 |
| clay, black to blue | 172 | 484 |
| sand and clay, alternating strata, water-bearing at 484-496 feet, 522-54- feet, 551-563 feet | 241 | 725 |
| clay, gravel, and wood | 15 | 740 |
| sand and gravel, water-bearing | 32 | 772 |
| clay and sand, alternating strata, water-bearing at 772-785 feet, 839-860 feet | 133 | 905 |
| sand, water-bearing, trace of oil and gas | 29 | 934 |
| "hardpan," gravel and clay | 19 | 953 |
| clay, sandy, some gas | 23 | 976 |
| sand, clay, "hardpan" at 992-995 feet, water-bearing at 978-991 feet | 129 | 1,105 |
| shale, blue-gray, sandstone layers at top | 101 | 1,206 |

### SECTION A-A'--continued

28/2E-16J: (b) (6) Altitude 10 feet. Drilled by T. G. Philpott, 1955. 132' x 6". SWL 3 ft., Dd 9 ft. at 40 gpm, Dec. 1955.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and gravel, with thin clay beds | 132 | 132 |

28/2E-22B: U.S. Coast Guard. Altitude 80 feet. Drilled by M. F. Ragsdale, 1948. Casing 109' x 6". Yields about 50 gpm. Chemical analysis available.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan," boulders | 12 | 12 |
| gravel, cemented | 15 | 27 |
| clay, blue | 2 | 29 |
| gravel, cemented | 5 | 34 |
| clay, blue | 44 | 78 |
| sand, gray, water-bearing | 31 | 109 |

### SECTION B-B'

27/1E-28A: Ballard Kiwanis. Altitude 65 feet. Drilled by T. G. Philpott, 1954. 69' x 6". SWL 61 ft., yields 7 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil, sand and gravel | 10 | 10 |
| clay, yellow and blue | 29 | 39 |
| "hardpan" | 9 | 48 |
| clay, yellow and blue | 17 | 65 |
| sand and gravel, water-bearing | 4 | 69 |

27/1E-27K: (b) (6) Altitude 280 feet. Drilled by T. C. Philpott 1953. 76' x 8". SWL 60 ft, 200 gpm yield. Perforated 71-76 ft.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, gravel | 5 | 5 |
| sand, clay | 22 | 27 |
| "hardpan" | 7 | 34 |
| sand, gravel, with clay | 37 | 71 |
| sand, gravel, water-bearing | 5 | 76 |

27/2E-28A: (b) (6) Altitude 160 feet. Drilled by T. G. Philpott 1956. 82' x 6". SWL 62 ft. DD 10 ft at 8 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, clay | 18 | 18 |
| gravel, clay | 4 | 22 |
| "hardpan" | 12 | 34 |
| sand, clay | 8 | 42 |
| "hardpan" | 28 | 70 |
| sand, clay, and gravel | 10 | 80 |
| sand, gravel, water-bearing | 2 | 82 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|

SECTION B-B'--continued

27/2E-22Q: (b) (6) Altitude 100 ft. Drilled by C. Ruby, 1944. Cased 140' x 6". SWL 27 ft., 1944.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| till | 30 | 30 |
| sand, water-bearing | 108 | 138 |
| gravel, water-bearing | 2 | 140 |

27/2E-25D: U.S. Army, Corps of Engineers. Altitude 400 ft. Drilled by Service Hardware, 1954. 295' x 6". SWL 230 ft. Dd 23½ ft at 20 gpm. Perforated 267-282 ft.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| gravel, cemented, with clay | 50 | 53 |
| clay, sand | 91 | 144 |
| sand, clay | 92 | 236 |
| sand, fine | 59 | 295 |

SECTION C-C'

26/1E-5J: (b) (6) Altitude 170 feet. Drilled by T. G. Philpott, 1956. 176' x 6". SWL 142 ft. Dd 28 ft at 5 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, clay and gravel | 9 | 9 |
| sand, clay, water-bearing | 91 | 100 |
| sand | 16 | 116 |
| clay, blue | 9 | 125 |
| silt | 10 | 135 |
| sand, fine, with seeps | 15 | 150 |
| silt | 5 | 155 |
| sand, blue clay, water-bearing | 25 | 180 |

26/1E-9L: (b) (6) Altitude 390 ft. Drilled by Stoican Drilling Co. 1959. 485' x 6"-4". SWL 175 ft. Dd 195 ft. at 11 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| "hardpan" | 16 | 19 |
| clay, sandy | 68 | 87 |
| sand, cemented | 43 | 130 |
| clay, blue, silty, with seeps 212-228 feet | 208 | 338 |
| sand and gravel, water-bearing | 2 | 340 |
| clay, blue | 10 | 350 |
| sand, blue, and clay | 22 | 372 |
| clay, blue and sand | 10 | 382 |
| sand and gravel, cemented | 10 | 392 |
| sand and gravel | 10 | 402 |
| sand, cemented | 3 | 405 |

26/1E-10M: U.S. Army, N.I.K.E. base. Altitude 280. Drilled by T. G. Philpott, 1955. 128' x 6". SWL 96 ft, Dd 16 ft at 18 gpm. Screened 118-128'.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan," with soft hardpan 36-41 ft | 100 | 100 |
| sand, gravel, and clay | 3 | 103 |
| sand, coarse, gravel, water-bearing | 25 | 128 |

26/1E-15K: (b) (6) Altitude 40 ft. Drilled by Nicholson Drilling Co., 1954. 203' x 8" flowing well. Perforated 191 to 201 ft.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| till | 30 | 30 |
| sand | 1 | 31 |
| clay, blue, sandy | 158 | 189 |
| sand and gravel, water-bearing | 14 | 203 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|

SECTION C-C'--continued

26/1E-13C: (b) (6) Altitude 365. Drilled by Sjolseth, 1954. 248' x 6". SWL 119 ft. Dd 4½ ft at 22 gpm. Perforated 246 to 247 ft.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan," soil, and gravel | 25 | 25 |
| sand, red, and mud, with seeps 50 to 95 | 70 | 95 |
| sand, silty, some gravel | 30 | 125 |
| sand, red, water-bearing | 50 | 175 |
| sand, medium and coarse, with gravel, fine | 20 | 195 |
| sand, clean and gravel, fine | 15 | 210 |
| sand, medium and coarse, with gravel | 36 | 246 |
| gravel, medium to coarse | 2 | 248 |

26/2E-18D: (b) (6) Altitude 365 ft. Drilled by Sjolseth, 1959. 284' x 6". Casing 268' x 6". SWL 115 ft. Dd 35 ft at 125 gpm. Screened 270 to 284 ft. Water temperature 52°.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay and "hardpan" | 100 | 100 |
| gravel, hard | 40 | 140 |
| clay and sand | 30 | 170 |
| sand, medium-grained | 30 | 200 |
| sand, dirty, with mud | 22 | 222 |
| sand, fine | 30 | 252 |
| sand, clean, medium-grained | 8 | 260 |
| sand, fine to coarse grained, and gravel, medium to coarse | 10 | 270 |

26/2E-9L: (b) (6) Altitude 10 ft. Drilled by T. G. Philpott, 1955. 46' x 6" flowing well.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand | 20 | 20 |
| gravel and sand, water-bearing | 6 | 26 |
| clay, blue | 20 | 46 |

26/2E-10R: Indianola Water Service. Altitude 115 ft. Drilled by J. L. Bell, 1955. 270' x ?".

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, gravel, clay and silt, alternating strata; water-bearing 35-53 ft, peat and wood bearing 67-100 and 135-146 ft | 146 | 146 |
| clay, blue, and gravel | 29 | 175 |
| clay, blue | 35 | 210 |
| clay, blue, and silt, with gravel | 28 | 238 |
| sand, blue, fine, and clay, water-bearing | 7 | 245 |
| sand, hard, with clay and gravel | 25 | 270 |

26/3E-7M: U.S. Navy. Altitude 110 ft. Drilled by J. J. Bell, 1942. Cased 136' x 10-6". Chemical analysis available.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| till | 38 | 41 |
| clay, blue, hard, and sand with fine gravel | 34 | 75 |
| sand and gravel | 53 | 128 |
| gravel, cemented, water-bearing | 8 | 136 |

## SECTION D-D'

26/1W-36K: (b) (6) [redacted] Altitude 110 ft. Drilled by T. G. Philpott, 1961. 140' x 6". SWL 106 ft.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and gravel | 4 | 4 |
| "hardpan" | 16 | 20 |
| sand, clay, and gravel | 70 | 90 |
| "hardpan," seeps at 90 ft | 26 | 116 |
| clay, yellow, and sand | 6 | 122 |
| sand, gravel, with clay, water-bearing | 18 | 140 |

26/1E-32M: U.S. Navy. Altitude 300 ft. Drilled by N. C. Jannsen. 700' x 10". Cased to 570 ft. Yields 550 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, loose | 30 | 30 |
| sand, hard | 30 | 60 |
| gravel, coarse | 20 | 80 |
| sand and gravel | 30 | 110 |
| sand | 35 | 145 |
| clay | 60 | 205 |
| sand, black, coarse, water-bearing | 5 | 210 |
| gravel, fine, water-bearing | 15 | 225 |
| clay, hard | 10 | 235 |
| rock | 25 | 260 |
| sand and clay | 20 | 280 |
| sand and gravel, water-bearing | 40 | 320 |
| clay, blue | 30 | 350 |
| sand, coarse, gravel and boulders, water-bearing | 220 | 570 |
| clay, blue | 130 | 700 |

26/1E-32L: U.S. Navy. Altitude 295 ft. Drilled by N. C. Jannsen, 1945. 165' x 8". SWL 129 ft, February, 1949. Dd 2 ft at 30 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand | 4 | 4 |
| "hardpan" | 36 | 40 |
| rock and gravel | 10 | 50 |
| gravel, cemented | 20 | 70 |
| sand and gravel, loose | 55 | 125 |
| sand and gravel | 33 | 158 |
| sand, water-bearing | 7 | 165 |

26/1E-32K: U.S. Navy. Altitude 295'. Drilled by N. C. Jannsen, 1944. 690' x 18"-10"-8". Casing set to 685 ft. SWL 228 ft, Sept., 1944. Dd 82 ft at 350 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 4 | 4 |
| "hardpan" | 5 | 9 |
| sand and gravel | 41 | 50 |
| gravel and boulders | 3 | 53 |
| sand, with fine gravel | 90 | 143 |
| clay, blue | 67 | 210 |
| gravel, black, hard | 65 | 275 |
| clay, sandy | 35 | 310 |
| gravel, sandy, hard | 55 | 365 |
| sand, water-bearing | 5 | 370 |
| gravel, hard | 15 | 385 |
| clay, blue, sandy | 70 | 455 |
| sand, hard, and gravel | 83 | 538 |
| sand, clay, and gravel, several strata each | 152 | 690 |

## SECTION D-D'--continued

26/1E-34C: (b) (6) [redacted] Altitude 165 ft. Drilled by C. Ruby, 1950. Cased 196' x 6". SWL 121 ft., Oct. 1950.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| till | 52 | 55 |
| clay, blue | 134 | 189 |
| clay, sandy | 1 | 190 |
| gravel, water-bearing | 6 | 196 |

26/1E-36N: U.S. Navy. Altitude 19 ft. Drilled by N. C. Jannsen, 1940. 1036' x 22"-12". Flowing well. Perforated 179-222 ft., 339-429 ft., 584-630 ft., 674-805 ft., 987-1036 ft.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 12 | 12 |
| till | 9 | 21 |
| gravel, fine and sand | 4 | 25 |
| clay, blue and brown, and gravel | 20 | 45 |
| clay, blue and gravel, with peat logs at 70 and 90 ft | 47 | 92 |
| clay | 47 | 139 |
| sand, clay, and gravel, undifferentiated | 897 | 1036 |

26/2E-33M: (b) (6) [redacted] Altitude 60 ft. Drilled by B. Strom, 1947. Cased 120' x 6".

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| till | 20 | 20 |
| clay, blue | 90 | 110 |
| gravel, water-bearing | 10 | 120 |

26/2E-34M: (b) (6) [redacted] Altitude 50 ft. Drilled by H. O. Meyer, 1945. Cased 68' x 6". SWL 48', Sept. 1945.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan" | 30 | 30 |
| clay, "hardpan" and sand | 7 | 37 |
| clay, some sand | 13 | 50 |
| clay, sand, and gravel, water-bearing | 18 | 68 |

26/2E-35G: Fay Bainbridge State Park. Altitude 70 ft. Dug by Rathburn. 35' x 24". SWL 12 ft. No drawdown at 5 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay and gravel | 35 | 35 |

## SECTION E-E'

25/1W-20D: (b) (6) [redacted] Altitude 95 ft. Drilled by Nicholson, 1959. Cased 180' x 6". SWL 90 ft. Dd 10 ft at 30 gpm. Perforated 95-120 ft, 125-150 ft.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan" | 90 | 90 |
| clay, yellow | 1 | 91 |
| "hardpan," yellow | 4 | 95 |
| "hardpan," rocky, water-bearing | 25 | 120 |
| "hardpan," with sand, water-bearing 125-152 ft | 32 | 152 |
| "hardpan," yellow | 38 | 190 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|
| | SECTION E-E'--continued | | |
| 25/1W-20J: | (b) (6) Altitude 20 ft. Drilled by T. G. Philpott, 1948. Cased 68' x 6". Flowed July, 1950, with 20 ft head. | | |
| | soil | 4 | 4 |
| | "hardpan" | 11 | 15 |
| | gravel, water-bearing | 2 | 17 |
| | gravel, cemented | 28 | 45 |
| | gravel, water-bearing | 6 | 51 |
| | gravel, cemented | 12 | 63 |
| | sand and gravel, water-bearing | 5 | 68 |
| 25/1E-17K: | Central Kitsap School Dist. #401. Altitude 180 ft. Drilled by Nicholson, 1956. 175' x 8". Cased to 170 ft. Screened 170-175 ft. SWL 80 ft. Dd 55 ft at 25 gpm. | | |
| | "hardpan," some sand | 72 | 72 |
| | sand, brown | 10 | 82 |
| | "hardpan," water-bearing sand | 13 | 95 |
| | clay, blue | 72 | 167 |
| | pea gravel, sand, water-bearing | 8 | 175 |
| 25/1E-21B: | (b) (6) Altitude 100 ft. Drilled by T. G. Philpott, 1948. Cased 91' x 6". SWL 31 ft, June, 1948. | | |
| | soil | 2 | 2 |
| | "hardpan" | 8 | 10 |
| | gravel, loose, water-bearing | 5 | 15 |
| | clay, sandy | 23 | 38 |
| | gravel, water-bearing | 8 | 46 |
| | sand, fine, with gravel | 9 | 55 |
| | sand, coarse | 25 | 80 |
| | sand | 5 | 85 |
| | gravel, fine, water-bearing | 3 | 88 |
| | sand, water-bearing | 3 | 91 |
| 25/1E-23K: | (b) (6) Altitude 190 ft. Drilled by T. G. Philpott, 1949. Casing 48' x 6", perforated at 40 ft. SWL 32 ft, June, 1949. | | |
| | dug well | 30 | 30 |
| | sand, fine | 8 | 38 |
| | clay, blue, with sand | 10 | 48 |
| 25/1E-24H: | (b) (6) Altitude 15 ft. Drilled by Wade, 1959. 274' x 8" flowing well. Dd 20 ft at 250 gpm. Temperature 48°F. | | |
| | sand, dirty | 250 | 250 |
| | clay, blue | 24 | 274 |
| 25/2E-20K: | Bainbridge Island School District. Altitude 70 ft. Drilled by H. O. Meyer. 62' x ?". SWL 52 ft. | | |
| | dirt and gravel | 15 | 15 |
| | clay | 7 | 22 |
| | "hardpan" | 23 | 45 |
| | clay, gray | 10 | 55 |
| | gravel, water-bearing | 4 | 59 |
| | clay and brown sand | 3 | 62 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|
| | SECTION E-E'--continued | | |
| 25/2E-21F: | (b) (6) Altitude 165 ft. Drilled by H. O. Meyer. Casing 86' x 6", perforated. SWL 61 ft, July, 1945. | | |
| | soil and gravel | 10 | 10 |
| | clay, gray | 15 | 25 |
| | "hardpan" and gravel | 27 | 52 |
| | clay, gravel, and water | 22 | 70 |
| | gravel | 5 | 75 |
| | gravel, water-bearing | 11 | 86 |
| 25/2E-27L: | (b) (6) Altitude 10 ft. Drilled by N. C. Jannsen, 1931. Cased 103' x 8", perforated 43-47 ft, and 93-103 ft. Flowing well, May, 1950. | | |
| | till (clay and rocks) | 9 | 9 |
| | gravel | 9 | 18 |
| | sand | 2 | 20 |
| | gravel, cemented | 3 | 23 |
| | gravel | 12 | 35 |
| | gravel and sand | 46 | 81 |
| | gravel | 22 | 103 |
| 25/2E-27K: | Town of Winslow. Altitude 40 ft. Drilled by Parker and Hill. 801' x 12"-8"-6". Casing perforated 743-782 ft. | | |
| | gravel, cemented, and sand | 109 | 109 |
| | clay, blue | 52 | 161 |
| | sand, fine | 9 | 170 |
| | gravel and sand, water-bearing | 15 | 185 |
| | clay | 65 | 250 |
| | clay and gravel | 20 | 270 |
| | clay, sandy | 50 | 320 |
| | silt, with clay streaks | 110 | 430 |
| | clay | 280 | 710 |
| | sand, coarse | 12 | 722 |
| | sand, fine | 35 | 757 |
| | sand and gravel, water-bearing | 39 | 796 |
| | clay | 5 | 801 |
| 25/2E-26G: | (b) (6) Altitude 130 ft. Drilled by N. C. Jannsen, 1930. Cased 175' x 6". SWL 80'(?). | | |
| | old well | 67 | 67 |
| | sand, brown | 30 | 97 |
| | clay, blue, and silt | 58 | 155 |
| | sand, black, fine | 16 | 171 |
| | sand, water-bearing | 4 | 175 |
| 25/2E-25C: | Y.W.C.A. Altitude 100 ft. Drilled by N. C. Jannsen, 1928. Cased 109' x 8". | | |
| | gravel | 15 | 15 |
| | "hardpan" | 5 | 20 |
| | clay, hard | 15 | 35 |
| | clay, blue, water-bearing at 52 ft | 23 | 58 |
| | clay and gravel | 2 | 60 |
| | gravel, cemented | 10 | 70 |
| | clay, sandy | 15 | 85 |
| | sand, fine, water-bearing at 93 ft | 24 | 109 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|
| | SECTION F-F' | | |
| 25/2W-35D: | Minnig Tree Farm. Altitude 280(?) ft. Drilled by T. G. Philpott. 324' x 6". SWL 305 ft, Sept., 1957. Dd 20 ft. at 3 gpm. | | |
| | sand, gravel and clay | 3 | 3 |
| | "hardpan," and sand, gravel | 107 | 110 |
| | sand and clay | 20 | 130 |
| | gravel, sand and clay | 35 | 165 |
| | sand and clay | 35 | 200 |
| | sand, gravel and clay | 35 | 235 |
| | "hardpan" | 5 | 240 |
| | sand, gravel, and clay, water-bearing 312-324 ft | 84 | 324 |
| 24/1W-6H: | (b) (6) [redacted] Altitude 460 ft. Drilled by T. G. Philpott, 1949. Cased 123' x 6". | | |
| | soil | 4 | 4 |
| | "hardpan" | 36 | 40 |
| | gravel and sand, hard | 18 | 58 |
| | gravel and sand, with yellow clay. | 27 | 85 |
| | clay, yellow, sandy | 36 | 121 |
| | gravel, water-bearing | 3 | 123 |
| 24/1W-2C: | (b) (6) [redacted] Altitude 430 ft. Drilled by T. G. Philpott. Cased 98' x 6". SWL 5-20 ft. | | |
| | soil and "hardpan" | 14 | 14 |
| | sand and gravel | 29 | 43 |
| | sand and clay | 15 | 58 |
| | "hardpan" | 11 | 69 |
| | sand and gravel, water-bearing | 26 | 95 |
| | sand, yellow | 3 | 98 |
| 24/1W-1A: | U.S. Marine Corps. Altitude 400 ft. Drilled in 1939. 371' x 12"-10"-8", with casing to 363 ft, screen 363-371 ft. SWL 258 ft, 1939. | | |
| | gravel, coarse, sand, and small rocks | 38 | 38 |
| | gravel, fine, and sand | 38 | 76 |
| | sand, some gravel | 5 | 81 |
| | clay, blue | 1 | 82 |
| | sand and gravel, with some clay | 219 | 301 |
| | clay, blue | 61 | 362 |
| | sand, fine, with gravel, water-bearing | 9 | 371 |
| 24/1E-5E: | Erland's Point Water Co., Inc. Altitude 75 ft. Drilled by Nicholson, 1955. Cased 251' x 12". Perforated 140-224 ft, 238-243 ft. Flowing well, March, 1955. Dd 42 ft at 500 gpm. | | |
| | sand and gravel | 20 | 20 |
| | "hardpan" | 5 | 25 |
| | clay and peat | 5 | 30 |
| | sand, gravel and clay, water-bearing | 17 | 47 |
| | clay, blue, sandy | 2 | 49 |
| | "hardpan" | 34 | 83 |
| | sand, fine, silty | 4 | 87 |
| | clay, blue | 1 | 88 |
| | "hardpan" | 7 | 95 |
| | sand, gravel and wood, with seeps | 5 | 100 |
| | clay, blue, with peat and wood | 17 | 117 |
| | sand, brown, fine, with clay, water-bearing | 13 | 130 |
| | clay, light gray to yellow, with seams of sand, gravel and water | 50 | 180 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|
| | SECTION F-F'--continued | | |
| 24/1E-5E: | Continued | | |
| | sand and gravel, with clay, water-bearing | 44 | 224 |
| | clay, blue | 6 | 230 |
| | clay, yellow, water-bearing | 12 | 242 |
| | gravel, water-bearing | 1 | 243 |
| | clay, yellow, and gravel | 11 | 254 |
| 24/1E-5Q: | (b) (6) [redacted] Altitude 40 ft. Drilled by T. G. Philpott, 1949. Cased 160' x 6". Supply reported "inadequate" and well not used. | | |
| | soil | 6 | 6 |
| | "hardpan" | 2 | 8 |
| | sand and gravel, water-bearing | 42 | 50 |
| | clay, blue | 110 | 160 |
| 24/1E-3R: | (b) (6) [redacted] Altitude 220 ft. Drilled by T. G. Philpott, 1950. Cased 100' x 6". SWL 10 ft, July, 1950. | | |
| | dug well | 15 | 15 |
| | clay and sand | 68 | 83 |
| | clay, hard, with sand | 12 | 95 |
| | sand, water-bearing, possibly into Tertiary bedrock | 5 | 100 |
| 24/1E-1J: | North Perry Ave. Water Dist. Altitude 365 ft. Drilling supervised by Robinson and Roberts, 1959. 419' x 12". SWL 110 ft, July 1959. Dd 81 ft at 750 gpm. Temperature 49½°F. | | |
| | "hardpan," sandy | 63 | 63 |
| | clay, blue | 122 | 185 |
| | "hardpan," sandy | 10 | 195 |
| | "hardpan" | 23 | 218 |
| | gravel, coarse | 9 | 227 |
| | gravel, cemented | 10 | 237 |
| | sand and gravel, tight | 15 | 252 |
| | sand and gravel, blue-gray, loose. | 21 | 273 |
| | "hardpan" | 2 | 275 |
| | sand and gravel, brown, loose | 23 | 298 |
| | clay, blue | 6 | 304 |
| | sand and gravel, loose | 3 | 307 |
| | sand, blue, fine | 34 | 341 |
| | gravel and sand | 7 | 348 |
| | gravel, cemented | 7 | 355 |
| | sand and gravel, blue-gray, tight. | 18 | 373 |
| | gravel and sand, loose | 19 | 392 |
| | gravel and sand, with clay layers. | 7 | 399 |
| | clay, hard | 20 | 419 |
| 24/2E-7D: | North Perry Water Dist. Altitude 320 ft. Drilled under supervision of Robinson and Roberts, 1955. 480 x 8". SWL 98 ft. Dd 112 ft at 412 gpm. | | |
| | clay, brown, sandy | 15 | 15 |
| | clay, blue, and sand | 71 | 86 |
| | gravel, brown, cemented | 9 | 95 |
| | "hardpan," blue | 13 | 108 |
| | "hardpan," gray | 69 | 177 |
| | sand, hard, and gravel | 9 | 186 |
| | clay, blue, with gravel and sand. | 8 | 194 |
| | clay, blue, with sand | 16 | 210 |
| | clay, gray | 106 | 316 |
| | sand, dark, water-bearing | 15 | 331 |
| | sand, dark, cemented | 28 | 359 |
| | gravel, fine, and sand, water-bearing | 20 | 379 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|
| | **SECTION F-F'--continued** | | |
| 24/2E-7D: | Continued | | |
| | gravel and sand ................ | 26 | 405 |
| | sand ......................... | 13 | 418 |
| | sand and gravel ................ | 18 | 436 |
| | gravel, cemented .............. | 21 | 457 |
| | sand ......................... | 23 | 480 |
| 24/2E-9H: | (b) (6) Altitude 15 ft. Drilled 1948. 135' x 6"-5". Cased to 125 ft. Yield reported 15 gallons per hour. | | |
| | "hardpan," with seepage 28-30 ft | 30 | 30 |
| | gravel, fine with sand and water .. | 2 | 32 |
| | "hardpan," gray, water-bearing at 128 ft ..................... | 96 | 128 |
| | shale, brown ................. | 1 | 129 |
| | shale, blue .................... | 6 | 135 |
| 24/2E-10B: | U.S. Navy. Altitude 166 ft. Drilled by N. C. Jannsen, 1948. 98' x 12"-8". SWL 35 ft, 1948. Reportedly pumps sand. Chemical analysis available. | | |
| | clay, yellow, and rock .......... | 20 | 20 |
| | sand, hard, and "hardpan" ....... | 15 | 35 |
| | clay, blue .................... | 10 | 45 |
| | sand and gravel, water-bearing ... | 40 | 85 |
| | clay.......................... | 13 | 98 |
| | **SECTION G-G'** | | |
| 24/2W-19A: | (b) (6) Altitude 145 ft. Drilled by T. G. Philpott, 1950. 184' x 6". SWL 140 ft, August, 1950. | | |
| | clay, yellow, and 2 ft of soil .... | 10 | 10 |
| | clay, blue, with sand ........... | 50 | 60 |
| | sand, clay and gravel ........... | 6 | 66 |
| | sand and gravel, with seepage, with "hardpan" at 68-74 ft and 76-78 ft ............... | 17 | 83 |
| | sand, fine, dry, water-bearing at 150-169 ft ................ | 86 | 169 |
| | clay, blue .................... | 2 | 171 |
| | sand, fine, water-bearing, with clay layers 178-184 ft........ | 13 | 184 |
| 24/2W-17R: | (b) (6) Altitude 60 ft. Drilled by T. G. Philpott, 1946. Cased 394' x 6". "Flowed at one time." | | |
| | soil and clay .................. | 5 | 5 |
| | gravel ........................ | 6 | 11 |
| | sand and gravel ................ | 17 | 28 |
| | clay, blue, with seepage 56-75'. | 112 | 140 |
| | clay and sand, water-bearing..... | 45 | 185 |
| | clay, blue .................... | 60 | 245 |
| | "hardpan"..................... | 11 | 256 |
| | sand, fine .................... | 26 | 282 |
| | sand,hard, blue, water-bearing... | 112 | 394 |
| 24/1W-29Q: | (b) (6) Altitude 525. Drilled by T. G. Philpott, 1949. Cased 85' x 6". Perforated 15-25 ft. | | |
| | soil ......................... | 2 | 2 |
| | gravel, water-bearing ........... | 26 | 28 |
| | clay, yellow, some sand ......... | 37 | 65 |
| | sand, hard .................... | 20 | 85 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|
| | **SECTION G-G'--continued** | | |
| 24/1W-35P: | (b) (6) Altitude 330 ft. Drilled by T. G. Philpott, 1947. Casing $87\frac{1}{2}$' x 6", gravel-packed. SWL 52 ft, 1947. | | |
| | dug.......................... | 40 | 40 |
| | gravel ........................ | 5 | 45 |
| | sand, fine .................... | 5 | 50 |
| | sand, water-bearing ............ | 10 | 60 |
| | sand and clay ................. | 14 | 74 |
| | sand, fine, water-bearing ........ | 5 | 79 |
| | sand and clay ................. | 8 | 87 |
| 24/1E-31A: | U. S. Federal Housing Authority<br><br>ERRATA NOTE: This well initially recorded by F. H. A., under Certificate 84-D, as located in T. 24 N., R. 1 E. Subsequent information discloses well to be same as 24/2E-31A, under current ownership of Annapolis Water District. See record of well as described under Section G'-G" on following page. | | |
| | **SECTION G'-G"** | | |
| 24/1E-32J: | (b) (6) Altitude 25 ft. Drilled by T. G. Philpott. Casing 110' x 6". Supplies three families. | | |
| | sand and gravel ................ | 20 | 20 |
| | "quicksand"................... | 75 | 95 |
| | gravel and sand, water-bearing ... | 15 | 110 |
| 24/1E-33L: | City of Bremerton. Altitude 25 ft. Drilled by N. C. Jannsen, 1945. Cased 622' x 16". Flowing well, 1949. Dd 66 ft at 875 gpm. Chemical analysis available. | | |
| | clay, blue .................... | 103 | 103 |
| | gravel, coarse................. | 13 | 116 |
| | clay, sandy, and fine sand....... | 32 | 148 |
| | sand, clay and gravel .......... | 92 | 240 |
| | clay and gravel ................ | 30 | 270 |
| | sand......................... | 34 | 304 |
| | gravel, cemented .............. | 30 | 334 |
| | clay,sandy .................... | 61 | 405 |
| | sand and gravel................ | 25 | 430 |
| | sand......................... | 70 | 500 |
| | sand, coarse .................. | 42 | 542 |
| | gravel ........................ | 18 | 560 |
| | gravel, coarse,to $1\frac{1}{2}$" diameter ... | 62 | 622 |
| 24/1E-26K: | City of Port Orchard. Altitude 100 ft. Drilled by O. E. Erdman, 1946. 792' x 10"-5". Cased to 780 ft, perforated 215-238 ft, and 764-780 ft. Temperature 49°F. Chemical analysis available. | | |
| | clay, blue .................... | 96 | 96 |
| | clay, brown .................... | 6 | 102 |
| | sand and gravel ................ | 40 | 142 |
| | clay, sandy .................... | 38 | 180 |
| | "hardpan" ..................... | 5 | 185 |
| | sand and gravel ................ | 30 | 215 |
| | gravel, fine .................... | 23 | 238 |
| | clay, sandy .................... | 270 | 508 |
| | sand, fine, with blue clay 636-648 ft ..................... | 256 | 764 |
| | gravel, coarse, water-bearing .... | 16 | 780 |
| | sand, fine .................... | 12 | 792 |

SECTION G'-G"--continued

**24/1E-25E:** Annapolis Water Dist. Altitude 35 ft. Drilled by N. C. Jannsen, 1945. Cased 1,133 ft (12" to 157 ft, 10" to 1,133 ft). Perforated 437-548 ft, 668-984 ft, 1,035-1,111 ft. Flowed 750 gpm in Oct., 1949, with 3 foot pressure head. Dd 55 ft at 1700 gpm in 45 hrs. Water has slight $H_2S$ odor.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand | 30 | 30 |
| clay, sandy | 230 | 260 |
| sand, fine to coarse | 160 | 420 |
| sand and gravel | 155 | 575 |
| clay, blue | 46 | 621 |
| clay, blue, and gravel | 29 | 650 |
| clay, blue, and sand | 16 | 666 |
| sand and gravel | 80 | 746 |
| gravel, cemented | 179 | 925 |
| sand | 65 | 990 |
| sand, clay and gravel | 30 | 1020 |
| sand and gravel | 47 | 1073 |
| sand and clay | 19 | 1092 |
| gravel, cemented | 41 | 1133 |

**24/2E-30Q:** (b) (6) Altitude 380 ft. Drilled by T. G. Philpott, 1948. Cased 92' x 6". SWL 64(?) ft.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| "hardpan" | 37 | 40 |
| sand | 22 | 62 |
| sand, yellow, and clay | 20 | 82 |
| sand and gravel, water-bearing | 10 | 92 |

**24/2E-31A:** Annapolis Water Dist. Altitude 350 ft. Drilled by N. C. Jannsen, 1943. Cased 1,006' x 22"-16", perforated 459-575 ft, and 627-647 ft. SWL 223 ft, August, 1943. Dd 91 ft at 325 gpm in 4 hrs.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand | 37 | 37 |
| sand and gravel, hard | 25 | 62 |
| clay | 45 | 107 |
| gravel | 16 | 123 |
| clay | 64 | 187 |
| clay, sandy | 86 | 273 |
| gravel | 8 | 281 |
| sand | 38 | 319 |
| gravel, hard | 6 | 325 |
| sand and clay, alternating strata | 444 | 769 |
| clay and gravel | 105 | 874 |
| clay, sandy | 132 | 1006 |

**24/2E-33J:** Manchester Water Dist. Altitude 35 ft. Drilled by W. D. Nicholson. Cased 185' x 12"-8"-6". Flowed 110 gpm August, 1960. Perforated 182-150 ft, 152-176 ft. Temperature 50°F.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, coarse, gravel, and "hard-pan" | 23 | 23 |
| clay, blue | 17 | 40 |
| clay, blue, with pebbles | 30 | 70 |
| sand, gravel and blue clay | 30 | 100 |
| sand, blue clay | 30 | 130 |
| clay, blue, and pebbles | 33 | 166 |
| sand, pea gravel, with clay | 2 | 168 |
| clay, blue | 12 | 180 |
| clay, blue, with interbed of loose fine silty sand | 5 | 185 |

**24/2E-34P:** (b) (6) Altitude 20 ft. Drilled by L. Stoican, 1951. Cased 141' x 6", perforated 133-141 ft. Flowed, 1951. Dd 8 ft at 16 gpm, June, 1951.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| dug well | 50 | 50 |
| clay, blue | 46 | 96 |
| sand, fine | 16 | 112 |
| clay, blue | 20 | 132 |
| "hardpan" | 6 | 138 |
| gravel, coarse | 3 | 141 |

**23/2E-2B:** U.S. Army Corps of Engineers. Altitude 40 ft. Drilled by Service Hardware, 1952. 297' x 10", casing 290' x 6", gravel-packed. Screen 290-296 ft. SWL 39 ft, Sept., 1952. Dd 80 ft at 25 gpm. Considerable amount of gas present at several levels, including aquifer.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay, blue | 172 | 172 |
| silt, fine, with a little water | 13 | 185 |
| clay, blue, with silt and fine sand streaks | 106 | 291 |
| sand, fine, water-bearing | 2½ | 293½ |
| clay with some gravel | 3½ | 297 |

**24/2E-25P:** Blake Island State Park. Altitude 160 ft. Drilled by Harbor Drilling Co., 1961. 190' x 6". SWL 145 ft. Dd 15 ft at 30 gpm bailed.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, silty and pebbles | 10 | 10 |
| sand, brown, silty | 18 | 28 |
| sand, dark, coarse, with seepage | 15 | 43 |
| silt, blue | 10 | 53 |
| clay, brown, green and blue, silty | 22 | 75 |
| sand, brown, silty | 23 | 98 |
| silt, yellow-brown, and gravel | 18 | 116 |
| silt, yellow | 14 | 130 |
| clay, yellow, silty | 8 | 138 |
| "hardpan," silty sand and gravel | 17 | 155 |
| sand, silty | 5 | 160 |
| gravel, tight, and water | 21 | 181 |
| "hardpan," blue and green | 9 | 190 |

SECTION H-H'

**23/2W-13H:** State Dept. of Institutions. Altitude 390 ft. Drilled by Stoican Drilling Co., 1960. 210' x 6". Casing 180' x 6", screened and perforated 170-180 ft. SWL 141 ft, November, 1950. Dd 15 ft at 125 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan," brown, and water-bearing sand and gravel, alternating 1-7 ft strata | 195 | 195 |
| clay, yellow | 8 | 203 |
| "hardpan," blue | 4 | 207 |
| gravel and sand, water-bearing | 1 | 208 |
| "hardpan," blue | 2 | 210 |

**23/1W-10D:** (b) (6) Altitude 160 ft. Drilled by T. G. Philpott, 1949. Cased 116' x 6". SWL 17 ft, spring, 1950.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay, sand, and some gravel | 46 | 46 |
| clay, blue | 10 | 56 |
| sand, fine, water-bearing | 12 | 68 |
| clay, blue | 1 | 69 |
| "quicksand" | 15 | 84 |
| sand with gravel | 22 | 106 |
| sand, medium-coarse | 10 | 116 |

SECTION H-H'--continued

**23/1W-11J:** Kitsap Co. Airport. Altitude 430 ft. Dug by E. Kirkland 1938. Casing 150' x 48". SWL 52 ft, March, 1940. Dd ½ ft at 75 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| gravel and boulders | 45 | 45 |
| sand, gray, hard | 40 | 85 |
| gravel, water-bearing | 27 | 112 |
| sand, hard | 18 | 130 |
| gravel and sand | 15 | 145 |
| sand, fine | 5 | 150 |

**23/1E-7D:** Sunny Slope Water Development Ass'n. Altitude 470 ft. Drilled by A. L. Nicholson, 1942. 219' x 8", cased to 199 ft, screened 199-219 ft. SWL 142 ft, Sept., 1952. Dd 28 ft at 110 gpm in 1½ hrs.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 2 | 2 |
| "hardpan," with water-bearing sand (2 gpm) 24-26 ft, 50-53 ft | 51 | 53 |
| "hardpan," clayey | 17 | 70 |
| "hardpan," rocky | 25 | 95 |
| sand, water-bearing (8 gpm) | 7 | 102 |
| clay, yellow | 10 | 112 |
| sand | 23 | 135 |
| clay, yellow-blue | 25 | 160 |
| clay, sandy | 20 | 180 |
| gravel and sand, water-bearing | 39 | 219 |

**23/1E-20A:** Washington Congregation - Christian Conference. Altitude 520 ft. Drilled by T. G. Philpott. 170' x 8". Screened and perforated 160-170 ft. SWL 138 ft. Dd 15 ft at 50 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, gravel and clay | 15 | 15 |
| "hardpan" | 24 | 39 |
| sand, gravel, and clay, seepage | 2 | 41 |
| clay, yellow and sand | 6 | 47 |
| sand, gravel, and clay, seepage | 2 | 49 |
| clay, yellow, and sand | 13 | 62 |
| sand, clay, and gravel, seepage | 3 | 65 |
| clay, yellow, and sand | 51 | 116 |
| sand and clay, water-bearing | 4 | 120 |
| sand and gravel, water-bearing | 20 | 140 |
| sand, clay, and gravel, water-bearing | 9 | 149 |
| sand and gravel, water-bearing | 21 | 170 |

**23/1E-14A:** (b) (6) Altitude 280 ft. Drilled by A. L. Nicholson. Cased 145' x 6". SWL 93 ft, Oct., 1950. Dd 7 ft at 22 gpm bailed.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand | 10 | 10 |
| sand, hard | 20 | 30 |
| silt | 45 | 75 |
| clay, yellow | 5 | 80 |
| sand and clay | 10 | 90 |
| sand | 51 | 141 |
| sand and fine gravel | 4 | 145 |

**23/2E-17M:** (b) (6) Altitude 140 ft. Drilled by T. G. Philpott. 52' x 6". Screen 47-52 ft. SWL 11 ft, Sept., 1956. Dd 30 ft at 20 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 4 | 4 |
| sand, clay, and gravel | 16 | 20 |
| gravel and sand, seepage | 26 | 46 |
| sand and gravel, water-bearing | 6 | 52 |

SECTION H-H'--continued

**23/2E-15N:** Tribune Publishing Co. Altitude 400 ft. Drilled by Nicholson, 1954. 139' x 10". Screened 134-139 ft. SWL 108 ft. Dd 8 ft at 36 gpm bailed.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan" | 28 | 28 |
| sand and gravel | 80 | 108 |
| sand, coarse, water-bearing | 31 | 139 |

**23/2E-22Q:** (b) (6) Altitude 40 ft. Dug and augered by Pichette and Morris, 1949. Cased 70' x 30".

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay, sandy | 20 | 20 |
| clay, blue | 17 | 37 |
| till, blue | 2 | 39 |
| clay, blue | 33 | 72 |

SECTION H'-H"

**23/2E-25M:** (b) (6) Altitude 340 ft. Drilled by L. C. Gaudio 1949. 100' x 6". Screen 85-90 ft. SWL 45 ft, July, 1949. Pumped 20 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and sandy clay | 65 | 65 |
| sand, water-bearing 85-90 ft | 35 | 100 |

**23/3E-31H:** (b) (6) Altitude 385 ft. Drilled by L. C. Gaudio, 1952. 342' x 8".

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay, blue, sandy, some rocks | 75 | 75 |
| "hardpan," and cemented sand and gravel | 29 | 104 |
| sand and gravel, alternating strata. | 35 | 139 |
| clay, blue, with streaks of fine sand | 105 | 244 |
| sand, fine, and clay | 8 | 252 |
| clay, blue, sandy | 38 | 290 |
| sand, very fine, "heaving" | 10 | 300 |
| clay, blue, sandy | 42 | 342 |

SECTION J-J'

**22/1W-10K:** Fern Lake Research Station. Altitude 220 ft. Drilled by Harbor Drilling Co., 1959. 55' x 6". SWL 32 ft, July, 1959. Dd 5 ft at 16 gpm, 1 hr.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 4 | 4 |
| "hardpan," brown | 36 | 40 |
| sand, coarse, and gravel, seepage | 12 | 52 |
| sand, dirty, fine | 8 | 60 |

**22/1W-11J:** Union Oil Co. Altitude 390 ft. Drilled by L. B. Richardson, 1949. Cased 352' x 6", casing perforated 280-290 ft. SWL 116 ft. Dd 1 ft at 16 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan" | 23 | 23 |
| clay, yellow, and gravel | 45 | 68 |
| clay, sandy | 14 | 82 |
| sand, water-bearing | 8 | 90 |
| clay, sandy, with some gravel strata | 68 | 158 |
| gravel, cemented | 10 | 168 |
| "hardpan" | 20 | 188 |
| clay, sand, and gravel | 12 | 200 |
| "hardpan" | 5 | 205 |
| clay, red to gray, sandy | 40 | 245 |
| sand, coarse, and gravel | 2 | 247 |
| clay, brown, sandy, and gravel | 13 | 260 |
| "hardpan" | 18 | 278 |
| clay, sand and gravel | 74 | 352 |

SECTION J-J'--continued

**22/1E-8H:** (b) (6) Altitude 305 ft. Drilled by T. G. Philpott, 1948. 100' x 6", cased to 80 ft, screen 80-100 ft.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| dug well | 61 | 61 |
| sand, fine | 19 | 80 |
| sand, coarse, and gravel | 10 | 90 |
| sand, fine | 10 | 100 |

**22/1E-10D:** (b) (6) Altitude 305 ft. Drilled by Harbor Drilling Co., 1958. 97' x 6". SWL 50 ft, Oct., 1958. Dd 21 ft at 20 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| dug well | 48 | 48 |
| "hardpan" | 29 | 77 |
| sand, brown, fine, water-bearing | 18 | 95 |
| sand and gravel, water-bearing | 2 | 97 |

**22/1E-12D:** (b) (6) Altitude 25 ft. Jetted by T. L. Ferguson. 353' x 2", cased to 343 ft. Flowing well, +105 ft. pressure head. Faint $H_2S$ odor.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil and blue clay | 7 | 7 |
| sand and gravel, water-bearing | 30 | 37 |
| clay, blue, and gravel | 9 | 46 |
| clay, blue | 13 | 59 |
| gravel and sand, water-bearing with artesian flow (3 lbs pressure) | 19 | 78 |
| gravel, with sand and clay | 19 | 97 |
| sand, fine, with clay | 95 | 192 |
| clay, blue, hard | 80 | 272 |
| sand, muddy | 23 | 295 |
| sand, gray, fine, hard | 3 | 298 |
| clay, blue, hard | 45 | 343 |
| sand, water-bearing, artesian pressure 46 lbs | 10 | 353 |

**22/1E-1P:** (b) (6) Altitude 130 ft. Drilled by Stoican, 1959. 638' x 8"-6"-4". SWL 8 ft. Dd 40 ft at 50 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 2 | 2 |
| "hardpan" | 43 | 45 |
| clay, blue | 13 | 58 |
| clay, silty, stratified, water-bearing | 4 | 62 |
| "hardpan" and blue clay | 18 | 80 |
| "hardpan" | 32 | 112 |
| clay, gray, hard, with silt and water-bearing sand | 363 | 475 |
| clay, blue | 155 | 630 |
| sand and gravel, water-bearing | 8 | 638 |

**22/2E-8E:** (b) (6) Altitude 365 ft. Drilled 1949. 82' x 30". SWL 79 ft, November, 1949.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 4 | 4 |
| "hardpan" | 4 | 8 |
| gravel | 6 | 14 |
| sand | 67 | 81 |
| gravel, water-bearing | 1 | 82 |

SECTION J'-J"

**22/2E-13D:** (b) (6) Altitude 400 ft. Drilled by L. C. Gaudio. 172' x 6". SWL 155 ft. Bailed 10 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| unknown | 43 | 43 |
| sand, brown, and gravel streaks | 57 | 100 |
| sand and gravel, cemented | 15 | 115 |
| sand and gravel, cemented, with streaks of loose sand | 43 | 158 |
| gravel, water-bearing, and clay | 14 | 172 |

**22/3E-16F:** Queen City Broadcasting Co. Altitude 25 ft. Drilled, 1941. 462' x 8". Perforated 440-460 ft. SWL 55 ft., Oct., 1941. Dd 60 ft at 40 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan" | 27 | 27 |
| sand and blue clay | 8 | 35 |
| clay blue | 45 | 80 |
| sand and gravel | 1 | 81 |
| shale, blue | 201 | 282 |
| clay, sandy | 93 | 375 |
| clay, blue | 70 | 445 |
| gravel, water-bearing | 15 | 460 |
| sand, water-bearing | 2 | 462 |

**22/3E-23D:** Wise Investment Co. Altitude 375 ft. Drilled by L. C. Gaudio, 1959. 382' (8" to 366', 6" to 380'). Casing perforated 365-380 ft. SWL 338 ft, Sept., 1959. Dd 17 ft at 30 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, gravel, and "hardpan" | 15 | 15 |
| clay, sandy | 5 | 20 |
| "hardpan" | 50 | 70 |
| sand and gravel | 9 | 79 |
| "hardpan," and boulders | 18 | 87 |
| sand and gravel | 69 | 156 |
| sand | 17 | 173 |
| clay | 6 | 179 |
| sand, water seepage | 16 | 195 |
| clay, blue | 90 | 285 |
| clay, blue, and gravel | 9 | 294 |
| sand, fine | 21 | 315 |
| sand and gravel | 8 | 323 |
| "hardpan," blue and green | 26 | 349 |
| clay | 9 | 358 |
| "hardpan," sand and gravel | 7 | 365 |
| sand and gravel | 17 | 382 |

**21/2E-1L:** (b) (6) Altitude 315 ft. Drilled by E. E. Axelsen, 1958. 180' x 6", cased 170 ft, screen 170-180 ft. SWL 150 ft. Dd 15 ft at 20 gpm. Temperature 52°F.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 5 | 5 |
| gravel, sand and clay | 30 | 35 |
| clay, blue | 115 | 150 |
| sand, fine, water-bearing | 30 | 180 |

**22/3E-31J:** (b) (6) Altitude 360 ft. Drilled by owner. Cased 493' x 8". SWL 162 ft. Dd 252 ft at 30 gpm. Temperature 50°F.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 13 | 13 |
| clay and sand | 40 | 53 |
| sand and gravel | 22 | 75 |
| clay, brown, and gravel | 10 | 85 |

SECTION J'-J"--continued

**22/3E-31J:** Continued

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and gravel, some clay | 111 | 196 |
| sand and seepage | 20 | 216 |
| clay blue | 183 | 399 |
| sand, gravel and clay, some water | 41 | 440 |
| sand, heavy with clay | 30 | 470 |
| clay and gravel, water-bearing | 23 | 493 |

**22/3E-32C:** Bard & Howard. Altitude 300 ft. Drilled by Robinson & Roberts, 1961. 423' x 12", cased to 391 ft, screened 396-417 ft. SWL 237½ ft, July, 1961. Dd 80 ft at 128 gpm. Temperature 52½°F.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| till | 60 | 60 |
| sand and gravel | 60 | 120 |
| sand, coarse to fine, water-bearing 270-275 ft | 161 | 281 |
| clay and sand, silty | 142 | 423 |

**22/3E-21J:** (b) (6) [redacted] Altitude 400 ft. Drilled by L. C. Gaudio, 1960. 518' x 6". SWL 378 ft. Yields 25 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan" | 28 | 28 |
| sand, gravel, and some clay | 17 | 45 |
| "hardpan" | 51 | 96 |
| sand and gravel, coarse | 5 | 101 |
| sand, with gravel | 24 | 125 |
| clay, blue | 5 | 130 |
| sand, clay, and gravel | 32 | 162 |
| "hardpan" | 24 | 186 |
| clay, brown, sandy, some gravel | 32 | 218 |
| sand, brown | 7 | 225 |
| clay and gravel | 73 | 298 |
| clay, blue, with some gravel and sand strata | 112 | 410 |
| sand, fine, and blue clay | 35 | 445 |
| sand, coarse, some gravel, water-bearing | 73 | 518 |

**22/3E-22C:** (b) (6) [redacted] Altitude 360 ft. Drilled by J. A. Weber, 1915. 432' x 6". SWL 352 ft. Total Hardness: 85 ppm; Iron: 0.5 ppm; pH: 7.0.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardness" | 50 | 50 |
| clay, blue | 50 | 100 |
| sand, fine | 331 | 431 |
| sand and gravel | 1 | 432 |

SECTION K-K'

**22/1W-34G:** (b) (6) [redacted] Altitude 5 ft. Drilled by Harbor Drilling Co., 1960. 81' x 6". SWL 5 ft., Oct., 1960. Dd 18 ft. at 30 gpm in 1 hr.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| clay, brown, hard | 7 | 10 |
| gravel, sandy, with clay and seepage | 19 | 29 |
| "hardpan" layers | 23 | 52 |
| sand | 3 | 55 |
| gravel, brown, and "hardpan," seepage | 14 | 69 |
| sand, brown clay and silt, and water-bearing gravel | 10 | 79 |
| "hardpan" | 1 | 80 |
| sand, coarse and gravel | 1 | 81 |

SECTION K-K'--continued

**21/1W-2C:** Peninsula School Dist. No. 401. Altitude 40 ft. Drilled by Stoican Drilling Co., 1955. 158' x 8". Cased to 114 ft. SWL 84 ft, April, 1955. Dd 33½ ft at 35 gpm. Temperature 48°F.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and clay | 20 | 20 |
| "hardpan" | 55 | 75 |
| sand, fine | 7 | 82 |
| sand and gravel, water-bearing | 6 | 88 |
| clay and sand | 9 | 97 |
| sand and gravel | 25 | 122 |
| clay | 36 | 158 |

**22/1W-36R:** (b) (6) [redacted] Altitude 40 ft. Drilled by Harbor Drilling Co., 1955. 47' x 6". SWL 20 ft, Oct., 1955. Dd 10 ft at 10 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 12 | 12 |
| sand and gravel | 18 | 30 |
| clay, blue | 15 | 45 |
| sand and gravel, water-bearing | 1 | 46 |

**22/1E-32P:** (b) (6) [redacted] Altitude 30 ft. Drilled by Harbor Drilling Co., 1958. 120' x 6". SWL 29 ft. Dd 34 ft at 15-20 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil, sand, gravel and brown "hardpan" | 40 | 40 |
| "hardpan," blue | 5 | 45 |
| sand and gravel, water-bearing | 12 | 67 |
| sand, brown, fine, water-bearing | 53 | 120 |

**21/1E-10C:** McDonald Realty Co. (Raft Island). Altitude 120 ft. Drilled by Harbor Drilling Co., 1959. 307' x 8", screened 302-307 ft. SWL 145 ft, Nov., 1959. Dd 13 ft at 45 gpm, bailed. 60 gpm capacity pump.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan," gravelly | 15 | 15 |
| sand and clay | 32 | 47 |
| clay, brown to blue, with some silt strata | 175 | 222 |
| sand, silty, water-bearing | 3 | 225 |
| clay, gray, blue, and white | 12 | 237 |
| sand, blue, and gravel, water-bearing | 1 | 238 |
| sand, gravel, clay and "hardpan," with water | 14 | 252 |
| sand, water-bearing | 55 | 307 |

**21/1E-2N:** (b) (6) [redacted] Altitude 60 ft. Drilled by Harbor Drilling Co., 1954. 160' x 6". SWL 35 ft, June, 1954. Dd 100 ft at 10 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 5 | 5 |
| "hardpan," sandy | 10 | 15 |
| sand, brown, water-bearing | 11 | 26 |
| clay, blue | 3 | 29 |
| sand, fine, hard, water-bearing | 12 | 41 |
| clay, blue | 117 | 158 |
| sand, hard, and gravel, water-bearing | 2 | 160 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|

SECTION K-K'--continued

**21/2E-6N:** (b) (6) [redacted] Altitude 300 ft. Drilled by Harbor Drilling Co., 1955. 203' x 6". SWL 176 ft, July, 1955. Dd 5 ft at 10 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| "hardpan," sandy | 17 | 20 |
| sand | 25 | 45 |
| sand, water-bearing | 5 | 50 |
| clay, blue | 40 | 90 |
| "hardpan" and blue clay | 10 | 100 |
| sand, brown, and gravel | 80 | 180 |
| "hardpan" | 5 | 185 |
| gravel and coarse sand, water-bearing | 19 | 204 |

**21/2E-8C:** Town of Gig Harbor. Altitude 60 ft. Drilled by Peter Sylte, 1951. 375' x 18" to 83 ft, gravel-packed 10" inner casing to 73 ft. Perforated 260-265 ft. Dd 31 ft at 340 gpm (SWL not given). Well pumped at "maximum rate of 550 gpm."

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| sand, gravel, and clay strata, 3-4 ft each | 46 | 49 |
| "hardpan" | 9 | 58 |
| "hardpan," sand, gravel and silt | 202 | 260 |
| gravel, cemented | 3 | 263 |
| gravel, clay, "hardpan" and silt | 112 | 375 |

SECTION K'-K''

**21/2E-1L:** (b) (6) [redacted] Altitude 315 ft. Drilled by Axelson. 180' x 6". Casing perforated 170-180 ft. SWL 150 ft. Dd 15 ft. at 20 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 5 | 5 |
| gravel, sand and clay | 30 | 35 |
| clay, blue | 115 | 150 |
| sand, fine, water-bearing | 30 | 180 |

**22/3E-31J:** (b) (6) [redacted] Altitude 360 ft. Drilled by owner. 493' x 8". Cased to 481 ft., open hole below. SWL 162 ft. Dd 252 ft. at 30 gpm. Temperature 50°F. Hardness as $CaCO_3$: 180 ppm, iron 0.3 ppm, pH 7.5, low in chloride.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 13 | 13 |
| clay, sand and gravel | 183 | 196 |
| sand, some water | 20 | 216 |
| clay, blue | 183 | 399 |
| sand, gravel, and clay, some water | 41 | 440 |
| sand, heavy, with clay | 30 | 470 |
| clay, some gravel, water-bearing | 23 | 493 |

**22/3E-32C:** Bard and Howard. Altitude 300 ft. Drilling supervised by Robinson and Roberts, 1961. 423' x 12". Cased to 391. Perforated 371-396 ft. Screened 396-417 ft. SWL 237½ ft. Dd 80 ft. at 128 gpm. Temperature 52½°F.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| till | 60 | 60 |
| sand and gravel | 60 | 120 |
| sand, fine to coarse | 161 | 281 |
| clay and sand, silty | 142 | 423 |

SECTION K'-K''--continued

**22/3E-21J:** (b) (6) [redacted] Altitude 400 ft. Drilled by L. R. Gaudio. 518' x 6". Cased to 514 ft. No perforations. Open hole below 514 ft. SWL 378.25 gpm pump.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan" | 28 | 28 |
| sand, gravel and clay | 17 | 45 |
| "hardpan" | 51 | 96 |
| sand, gravel and clay | 66 | 162 |
| "hardpan" | 24 | 186 |
| sand, gravel and clay | 122 | 308 |
| clay, blue, sandy | 52 | 360 |
| sand and gravel | 16 | 376 |
| sand and clay | 138 | 514 |
| sand, coarse, water-bearing, some gravel | 4 | 518 |

**22/3E-22C:** (See Section J'-J'')

SECTION L-L'

**21/1W-34L:** (b) (6) [redacted] Altitude 225 ft. Drilled by Harbor Drilling Co., 1959. 192' x 6". Screened 187-192 ft. SWL 160 ft, August, 1959. No drawdown at 22 gpm bailed.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 8 | 8 |
| "hardpan", sandy | 13 | 21 |
| sand and gravelly "hardpan" | 147 | 168 |
| sand, hard, and gravel, water-bearing | 24 | 192 |

**21/1W-36D:** (b) (6) [redacted] Altitude 65 ft. Drilled by Harbor Drilling Co., 1960. 297' x 8". Cased 279' x 8", screened 191-201 ft. SWL 66 ft, July, 1960. Dd 71 ft at 50 gpm, bailed 4 hrs.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, gravel, and "hardpan" | 33 | 33 |
| sand, brown, water-bearing 84-122 ft | 144 | 177 |
| sand, blue, fine, water-bearing, with several alternating strata of blue clay | 120 | 297 |

**21/1E-28D:** (b) (6) [redacted] Altitude 30 ft. 58' x 6". SWL 28 ft, August, 1959. Dd 6 ft at 22 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan," gravelly | 12 | 12 |
| "hardpan," blue-gray | 44 | 56 |
| sand, coarse, and gravel, water-bearing | 2 | 58 |

**21/1E-28C:** (b) (6) [redacted] Altitude 25 ft. Drilled by Harbor Drilling Co., 1958. 47' x 6". SWL 21 ft, August, 1958. Dd 7 ft at 15 gpm in 1 hr.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| dug well | 18 | 18 |
| "hardpan," brown sand and gravel | 13 | 31 |
| "hardpan," brown, seepage | 4 | 35 |
| sand, brown, hard, with seepage | 1 | 36 |
| "hardpan" | 2 | 38 |
| sand and gravel, hard | 9 | 47 |

SECTION L-L'--continued

**21/1E-22N:** (b) (6) [redacted]. Altitude 40 ft. Drilled by Harbor Drilling Co., 1959. 83' x 6". SWL 27 ft, June, 1959. Dd 22 ft at 18 gpm bailed in hr.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| dug | 27 | 27 |
| "hardpan," gravelly | 4 | 31 |
| sand | 4 | 35 |
| "hardpan" | 13 | 48 |
| sand, gravel, with "hardpan" | 2 | 50 |
| "hardpan," brown | 12 | 62 |
| sand and gravel, water-bearing | 2 | 64 |
| "hardpan" | 9 | 73 |
| sand and gravel, water-bearing | 5 | 78 |
| "hardpan," blue | 4 | 82 |
| sand and gravel, water-bearing | 1 | 83 |

**21/1E-24J:** (b) (6) [redacted] Altitude 10 ft. Drilled by Harbor Drilling Co., 1959. 124' x 6". Flowed, July, 1959. Dd 50 ft at 20 gpm bailed.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| "hardpan," brown | 22 | 25 |
| sand, brown, with some gravel | 66 | 91 |
| clay, blue | 25 | 116 |
| sand and gravel, water-bearing | 8 | 124 |

**21/2E-20L:** (b) (6) [redacted] Altitude 110 ft. Drilled by Harbor Drilling Co. 84' x 6". SWL 58 ft. Dd 10 ft at 14 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan" | 20 | 20 |
| sand, brown | 50 | 70 |
| sand, clean | 10 | 80 |
| sand, coarse, and gravel | 4 | 84 |

**21/2E-21C:** Westbridge Estates Water Co. Altitude 210 ft. Drilled by Harbor Drilling Co. 255' x 8", casing perforated 250-255 ft. SWL 195 ft. Dd 7 ft at 35 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| "hardpan," and boulders | 28 | 31 |
| sand, brown, and "hardpan" | 67 | 98 |
| sand, gravel, and "hardpan" | 59 | 157 |
| sand, brown | 33 | 190 |
| sand, brown, fine, water-bearing | 47 | 237 |

SECTION M-M'

**20/1W-27K:** (b) (6) [redacted] Altitude 200 ft. Drilled by Stoican Drilling Co., 1961. 216' x 6", perforated 206-216 ft. SWL 185 ft, April, 1961. Dd 15 ft at 25 gpm. Temperature 52°F.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 3 | 3 |
| "hardpan," brown | 71 | 74 |
| sand | 1 | 75 |
| clay, blue | 24 | 99 |
| peat | 1 | 100 |
| clay, blue | 8 | 108 |
| sand, black, fine, clay and silt, stratified | 8 | 116 |
| peat | 7 | 123 |
| sand and blue clay, stratified | 17 | 140 |
| peat, wood, sand, silt, and blue clay | 18 | 158 |
| "hardpan", brown | 44 | 202 |
| sand, brown, fine, water-bearing | 3 | 205 |
| sand, brown, coarse, water-bearing | 11 | 216 |
| clay, blue | | at 216 |

SECTION M-M'--continued

**20/1W-24F:** (b) (6) [redacted] Altitude 75 ft. Drilled by Tacoma Pump Co., 1947. Cased 285' x 8". SWL 60 ft, May, 1947. Dd 110 ft at 33 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| "hardpan" | 70 | 70 |
| sand, water-bearing | 30 | 100 |
| clay and sand | 60 | 160 |
| sand, water-bearing | 20 | 180 |
| clay, sand, and gravel | 105 | 285 |

**20/1W-11C:** Peninsula School Dist. No. 401. Altitude 220 ft. Drilled by Stoican Drilling Co., 1955. Cased 224' x 8". SWL 214 ft, March, 1955. Dd 6 ft at 100 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and clay | 58 | 58 |
| gravel, cemented | 39 | 97 |
| sand and gravel | 41 | 138 |
| sand | 8 | 146 |
| sand and gravel | 16 | 162 |
| sand, fine | 20 | 182 |
| sand, gravel, some clay | 16 | 198 |
| sand, clean, and gravel | 26 | 224 |

**21/1W-34L:** (See Section L-L')

**21/1W-23M:** K.P.S.C. Grounds. Altitude 220 ft. Drilled by Harbor Drilling Co., 1956. 75' x 6". SWL 55 ft, January, 1956. Dd 12 ft at 12 gpm in 1 hr.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 2 | 2 |
| "hardpan," brown | 33 | 35 |
| sand, brown, and gravel, water-bearing | 18 | 53 |
| "hardpan," clay | 12 | 65 |

**22/1W-36R:** (See Section K-K')

**22/1E-30H:** (b) (6) [redacted] Altitude 230 ft. Drilled by Harbor Drilling Co., 1960. 196' x 4". SWL 155 ft, Sept., 1960. Dd 4 ft at 15 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and gravel, seepage 170-175 ft | 175 | 175 |
| sand, brown, water-bearing | 11 | 186 |
| sand, coarse, and gravel, water-bearing | 10 | 196 |

**22/1E-8H:** (See Section J-J')

**23/1E-27Q:** (b) (6) [redacted] Altitude 430 ft. Drilled by Tacoma Pump Co., 1946. Cased 100' x 6". SWL 82 ft. Supplies 3 families. Chloride: 5 ppm; Hardness as $CaCO_3$: 35 ppm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil | 5 | 5 |
| "hardpan" | 27 | 32 |
| gravel and sand, stratified | 68 | 100 |

**23/1E-14A:** (See Section H-H')

**23/1E-12E:** (b) (6) [redacted] Altitude 310 ft. Drilled by A. L. Nicholson, 1946. Cased 318' x 6". SWL 25 ft, 1946.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand | 83 | 83 |
| clay, yellow | 2 | 85 |
| sand, water-bearing | 105 | 190 |
| clay, blue | 127 | 317 |
| sand, black, water-bearing | 1 | 318 |

| Well Number | Material | Thickness (feet) | Depth (feet) |
|---|---|---|---|

SECTION M'-M"

23/1E-1E: (b) (6) [redacted] Altitude 330 ft. Drilled by Osborn Drilling Co., 1947. 136' x 6", perforated 135-138 ft. SWL 27 ft, Sept., 1947. Dd 50 ft at 30 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay | 15 | 15 |
| sand | 5 | 20 |
| "hardpan" (cemented gravel) | 84 | 104 |
| sand, fine | 8 | 112 |
| shale, blue | 22 | 134 |
| sand and gravel | 2 | 136 |

24/1E-25E: (See Section G'-G")

24/1E-23B: U.S. Navy. Altitude 20 ft. Drilled by Joslyn and Gibson, 1895. 748' x 6"-4½". Flowing well, 1895.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| no record | 300 | 300 |
| sand, black, fine | 253 | 553 |
| sand and clay, hard | 14 | 567 |
| gravel, cemented | 10 | 577 |
| sand, black, fine, water-bearing | 171 | 748 |

24/1E-12E: City of Bremerton. Altitude 260 ft. Drilled by International Water Supply, Ltd., 1942. 914' x 8". SWL 73.3 ft, Nov., 1942. Yields 25 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, clay and gravel | 13 | 13 |
| clay, blue, with some sand, boulders | 179 | 192 |
| sand, coarse, and gravel, water-bearing | 10 | 202 |
| sand, fine | 18 | 220 |
| sand and shale | 30 | 250 |
| shale, blue, hard, sandy | 374 | 624 |
| shale, gray | 89 | 713 |
| shale, gray, and boulders | 29 | 742 |
| unrecorded | 172 | 914 |

24/1E-2A: (b) (6) [redacted] Altitude 330 ft. Drilled by A. L. Nicholson, 1945. Cased 333' x 6".

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| dug, no record | 15 | 15 |
| sand | 82 | 97 |
| clay, blue, and fine sand | 236 | 333 |

25/1E-25M: (b) (6) [redacted] Altitude 240 ft. Drilled by A. L. Nicholson. 156' x 6". Perforated 79-125 ft. SWL 70 ft. Dd 5 ft at 50 gpm.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand, brown | 43 | 43 |
| "hardpan" | 6 | 49 |
| sand, water-bearing, "5 gpm" | 1 | 50 |
| "hardpan," with seepage | 80 | 130 |
| clay, blue | 8 | 138 |
| gravel and sand, water-bearing | 2 | 140 |
| peat | 6 | 146 |
| clay, blue, and sand | 10 | 156 |

25/1E-23K: (See Section E-E')

SECTION M'-M"--continued

25/1E-10J: (b) (6) [redacted] Altitude 245 ft. Drilled by T. G. Philpott, 1950. Cased 225' x 6". SWL 60 ft, Nov., 1950.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| dug, "hardpan" and sand | 50 | 50 |
| sand, water-bearing | 11 | 61 |
| clay, blue | 8 | 69 |
| clay, some sand and water | 9 | 78 |
| sand, water-bearing | 78 | 156 |
| sand and gravel, cemented, hard (till?) | 66 | 222 |
| sand, water-bearing | 3 | 225 |

26/1E-36N: (See Section D-D')

26/1E-25C: (b) (6) [redacted] Altitude 200 ft. Drilled by C. Ruby, 1946. Cased 155' x 6".

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| soil and ? | 8 | 8 |
| clay, blue | 146 | 154 |
| gravel, water-bearing | 1 | 155 |

26/1E-13C: (See Section C-C')

27/2E-28C: (See Section B-B')

27/2E-17J: (b) (6) [redacted] Altitude 25 ft. Drilled by C. Ruby, 1950. Cased 66' x 6". SWL 22 ft, Sept., 1950.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay, sandy | 25 | 25 |
| clay, blue | 32 | 57 |
| sand, coarse | 9 | 66 |

27/2E-17A: (b) (6) [redacted] Altitude 45 ft. Drilled by C. Ruby, 1950. Cased 142' x 6". SWL 11 ft. Water reported of poor quality.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| clay, sandy | 25 | 25 |
| clay, blue | 32 | 57 |
| sand, coarse | 9 | 66 |

27/2E-7A: Pope and Talbot, Inc. Altitude 60 ft. Drilled by Robinson & Roberts, 1957. Cased 169' x 10"-8", perforated 159-169 ft. SWL 56 ft. Dd 66 ft at 100 gpm. Temperature 51°F.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand | 6 | 6 |
| clay, sandy | 19 | 25 |
| "hardpan" | 4 | 29 |
| clay, blue, with sand and gravel strata | 153 | 182 |

27/2E-6Q: Pope and Talbot, Inc. Altitude 40 ft. Drilled by Gaudio Drilling Co. 267' x 10". Well abandoned.

| Material | Thickness (feet) | Depth (feet) |
|---|---|---|
| sand and clay | 10 | 10 |
| sand, gravel, and clay | 4 | 14 |
| clay, blue | 2 | 16 |
| sand, gravel and clay ("hardpan") | 54 | 70 |
| blue clay, with gravel and sand strata | 84 | 154 |
| gravel, cemented, with shells | 72 | 226 |
| silt and gravel | 8 | 234 |
| shale, sandy, with pebbles | 33 | 267 |

## APPENDIX B

Appendix B lists pertinent data on municipal, community and group water supply systems in the report area as determined from records of the State and County Health Departments and water-right filings on record with the Division of Water Resources.

The systems found in each county in the report area are listed alphabetically by name in the first column. Systems that do not have a specific name are listed according to the last name of the owner or other major official. The letters following each name, (O), (S) or (M), indicate, respectively, owner, superintendent, or manager or other official. The location of each system is indicated by either the address of the owner or official, by the community name, or by general locality.

The type of ownership is shown in the second column along with application numbers of established water rights, if any. The letter "A" preceding a number indicates a ground-water application and the letter "R", a reservoir application. The numbers without letters refer to surface water appropriations. More detailed information about each water right is given in the Water Use Section of the report and in Appendices C, D, and E.

The third column provides an estimate of the 1962 connected population for each system. The fourth and fifth columns indicate, respectively, the approximate number of services and meters in the systems and the sixth column gives the source or sources of the supply.

Estimates of the average daily usage in gallons per day are shown in the seventh column. The amount of storage available in a system is given in the eighth column in terms of non-gravity storage, or stored water at low levels that must be pumped into the system, and gravity storage, or stored water at generally high levels that flows by gravity into the system.

Any treatment or control of the supply, for purposes of purification or removal of suspended material or other objectional constituents, is indicated in the last column of the table.

Blank spaces in any of the numerical columns of the table do not imply a value of zero but rather indicate that no reliable information was available for those items.

## APPENDIX B

## MUNICIPAL, COMMUNITY AND GROUP WATER SYSTEMS IN THE KITSAP REPORT AREA

| System Name<br>Owner (O), Supt. (S), Manager or Other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application Number<br>(A - Groundwater, R - Reservoir) | Estimated 1962 Connected Population | Number of Services |
|---|---|---|---|
| KITSAP COUNTY | | | |
| Allen's Well System<br>(b) (6) [redacted]<br>Winslow | Private | | |
| Annapolis Water District<br>T. Crump (S)<br>Annapolis | Water District<br>A23 | 2,800 | 900 |
| (b) (6) [redacted] (O)<br>Rt. 1, Box 19, Winslow | Private<br>D1075 | 200 | |
| Apple Tree Point Water Co.<br>(b) (6) [redacted] (O)<br>Kingston | Private | 70 | 20 |
| Bella Vista Park Water System<br>(b) (6) [redacted] (O)<br>Box 594, Poulsbo | Private<br>A6324 | 14 | 4 |
| Berst Water Supply<br>(b) (6) [redacted] (O)<br>Port, Orchard | Private | | |
| Bethel Community Water System<br>L. Osborne (M)<br>Rt. 3, Box 208, Port Orchard | Water District<br>A556 | 55 | 15 |
| Bremerton<br>E. G. Humble (S)<br>City Hall, Bremerton | Municipal<br>A5570, 2598, 2599, 9717,<br>9718, 13552, R4178, R13553 | 38,000 | 11,600 |
| Broadview Beach Water System<br>A. Babb (M)<br>(b) (6) [redacted] Bremerton | Private | | 50 |
| (b) (6) [redacted]<br>Eglon | Private<br>6707 | | (resort supply) |
| Bucklin Hill Water Corp.<br>T. Simons (M)<br>Rt. 4, Box 2283, Bremerton | Private<br>A5661 | 20 | 8 |
| Burley Water District<br>K. Anderson (M)<br>Burley | Water District | 63 | 18 |
| Central Kitsap School Dist. No. 401<br>W. Waxmuth (M)<br>Box 2, Silverdale | School<br>13012 | | (school) |
| City of Seattle Housing Authority<br>825 Yesler Way, Seattle<br>(serves Winslow Park) | Municipal<br>A283 | | |
| Cliffside Development Co.<br>M. M. Dotson (M)<br>3743 South 142nd Street, Seattle | Private<br>A6463 | | |
| Country Club Estates Water System<br>(b) (6) [redacted] (O)<br>2300 - 6th Street, Bremerton | Private<br>A6225 | | 46<br>(proposed) |
| Creosote Water System<br>West Coast Wood Preserving Co. (O)<br>Creosote | Private | 100 | 12 |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| | Well | | | | |
| 900 | 2 wells | 200,000 | | 650,000 | Taste and odor control with chlorine gas |
| | Well | | | | |
| | Unnamed Spring | | | | |
| | Well | | | | |
| | Well | | | 880 | |
| 11,600 | Anderson, Charleston & Gorst Creeks, Union River & 7 wells | 5,500,000 | | 28,550,000 | Ammoniated with ammonia gas & disinfected with chlorine gas. Supply is laboratory controlled |
| | Silver Creek | | | | |
| | Well | | | 8,000 | |
| 0 | Well | | | 8,500 | |
| | Unnamed Spring | | | 13,800 | |
| | Well | | | | |
| | Well | | 500 (proposed) | | |
| | Well | | | | |
| | 2 wells | | | | |

| System Name<br>Owner (O), Supt. (S), Manager or other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application No.<br>(A - Groundwater, R - Reservoir) | Estimated 1962<br>Connected Population | Number of<br>Services |
|---|---|---|---|
| KITSAP COUNTY - continued | | | |
| Crescent Bay Water Supply<br>E. M. Grout (M)<br>Hansville | Private | 55 | 15 |
| Crystal Springs Water Supply<br>L. R. Glosten (S)<br>Rt. 1, Box 760, Port Blakely, Bainbridge Island | Private | 64 | 20 |
| Deseret Park Water System, Inc.<br>B. Fry (M)<br>Rt. 5, Box 844-B, Bremerton | Private<br>A4406 | 64 | 20 |
| Eldorado Beach Water System<br>P. Hanify (M)<br>Star Rt. 1, Box 60, Bremerton | Private | 150 | 44 |
| Eldorado Water Co.<br>J. Mentor (S)<br>Rt. 4, Box 2350, Bremerton | Private | 170 | 44 |
| Eldorado Water District, Inc.<br>R. B. Rasmussen (M)<br>Star Rt. 1, Box 34, Bremerton | Water District<br>5213, 5214, 14906 | | 44 |
| Enetai Community Co-op<br>G. H. Bechtel (M)<br>Box 167, Bremerton | Co-op<br>7855, 8552 | 210 | 60 |
| Erdmann Water System<br>(b) (6) [redacted] (O)<br>Star Rt. 1, Box 10, Bremerton | Private<br>17029 | | 10 |
| Erland's Point Water Company, Inc.<br>C. H. Coons (M)<br>Rt. 2, Box 970, Bremerton | Private<br>A3817, 6852 | 1,100 | 220 |
| Fay Bainbridge State Park | State<br>D207 | | |
| Federal Housing Authority<br>1326 - 5th Avenue, Seattle<br>(serves Orchard Heights area) | Municipal<br>D55, D53 | 22,000 | |
| Ferncliff Water Association, Inc.<br>J. Heeter (M)<br>Rt. 2, Box 2380, Bainbridge Island | Water Association | 60 | 20 |
| Fletcher Bay Water and Road Corp.<br>Fletcher Bay (Port Blakely), Bainbridge Island | Private | | |
| Fort Ward Supply<br>J. S. Devinny (M)<br>9202 - 15th N.W., Seattle | Private | 150 | 40 |
| (b) (6) [redacted] (O)<br>Rt. 5, Box 74, Port Orchard | Private<br>A645 | 80 | |
| Gaffner Tracts Water District<br>F. L. Larson (M)<br>Box 258, Retsil | Water District | | |
| Gilberton Water Co.<br>(b) (6) [redacted] O)<br>Rt. 5, Box 1036, Bremerton | Private<br>17267 | 800 | 80 |
| (b) (6) [redacted] (O)<br>Box 666, Suquamish | Private<br>6441, 15410 | | 10 |
| Harlow Burks Estate Water System<br>H. E. Burks (M)<br>Rt. 1, Box 1889, Bremerton | Private | 60 | |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| | Unnamed stream | | | | |
| | Unnamed springs | | | | |
| | Well | | 1,000 | 50,000 | |
| 0 | Unnamed stream | | | 20,000 | Disinfect with hypochlorites |
| 0 | Unnamed stream | 10,000 | | 50,000 | Disinfected with hypochlorites |
| 0 | Unnamed stream | | | 18,000 | |
| 0 | Enetai Spring | 18,000 | | 30,000 | |
| | Unnamed stream | | | | |
| 220 | Well & unnamed stream (aux.) | | | 125,000 | Disinfected with hypochlorites (stand by) |
| | Well | | 315 | | |
| | 2 wells | | | | |
| | Well | | | | |
| | 4 wells & unnamed springs | | 30,000 | 60,100,000 | Sand filter |
| | Well | | | | |
| | Unnamed stream | | | | |
| 80 | 2 unnamed springs | 15,000 | | 37,000 | |
| | Unnamed stream | | | | |
| | 2 wells | | 1,000 | | |

| System Name<br>Owner (O), Supt. (S), Manager or other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application No.<br>(A - Ground water, R - Reservoir) | Estimated 1962<br>Connected Population | Number of<br>Services |
|---|---|---|---|
| KITSAP COUNTY - continued | | | |
| Harlow Water System<br>(b) (6) [redacted] (O)<br>(b) (6) [redacted] Bremerton | Private<br>D1 | | |
| Holly Water System<br>G. R. Wilkinson (M)<br>Bremerton | Private | 150 | 40 |
| Howe's Water System<br>Howe Motor Company (O)<br>702 Bay, Port Orchard | Private | | |
| (b) (6) [redacted] Well Water Supply<br>(b) (6) [redacted] (O)<br>Bremerton | Private | | |
| Illahee Improvement Club<br>E. C. Searle (M)<br>Route 1, Box 336, Manette | Municipal<br>1277 | | |
| Illahee State Park | State | | |
| Illahee Water District<br>R. M. Searle (M)<br>Route 5, Box 840, Bremerton | Water District | | |
| Indianola Water Company<br>(b) (6) [redacted] (O)<br>Route 1, Box 139, Olalla | Private<br>A761, A2125, A6259, 3526 | 1,040 | 265 |
| Island Lake Bible Camp, Inc.<br>H. J. Bohl (M)<br>Route 3, Box 210, Poulsbo | Private<br>13907 | | |
| Island Lake Water Company<br>(b) (6) [redacted] (O)<br>Box 445, Poulsbo | Private | 75 | 27 |
| Jefferson Beach Supply<br>H. K. Schroeder (M)<br>11204 Roosevelt Way, Seattle | Private | 70 | 20 |
| Kaster Water System<br>(b) (6) [redacted] (O)<br>Box 707, Poulsbo | Private<br>A6618 | (proposed development) | 0 |
| Keyes Well Water System<br>(b) (6) [redacted] (O)<br>Winslow | Private | | |
| Keyport Water Company<br>(b) (6) [redacted] (O)<br>Box 174, Keyport | Private | 420 | 120 |
| Keyport Water System<br>(b) (6) [redacted] (O)<br>Keyport | Private<br>5513 | | |
| Kingston Water District<br>M. Ranstad (M)<br>Indianola | Water District | | |
| Kingston Water Users Corporation<br>Box 204, Kingston | Municipal<br>A5839 | 500 | 80 |
| Kitsap County P.U.D. No. 1<br>525 Sweaney Street, Port Orchard | Municipal<br>15875, 15876, 15877R | (proposed system) | |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| | Well | | | | |
| 0 | Unnamed stream | | | 10,000 | |
| | Well | | | | |
| | 3 unnamed springs | | | | |
| | Uses City of Bremerton water | | | | |
| | Purchase water from North Perry Water District | | | | |
| 265 | Well and Indianola Creek | 60,000 | | 110,000 | Disinfected with hypochlorites (stand by) |
| | Island Lake | | | | |
| 27 | Island Lake | 2,500 | | 5,000 | Disinfected with hypochlorites |
| | Well | | | | |
| | Well | | | | |
| 120 | Springs and well | 23,000 | | 8,000 | Disinfected with hypochlorites |
| | Unnamed spring | | | | |
| 0 | 3 wells | | | 100,000 | |
| | Gold Creek and Lost Creek | | | | |

| System Name<br>Owner (O), Supt. (S), Manager or other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application No.<br>(A - Ground water, R - Reservoir | Estimated 1962<br>Connected Population | Number of<br>Services |
|---|---|---|---|
| KITSAP COUNTY - continued | | | |
| Kitsap County Water Dist.<br>J. E. Wyatt (M)<br>Star Route 1, Box 172, Bremerton | Water District | | |
| Kitsap Lake Development Association<br>O. Wigant (M)<br>Route 2, Box 507, Bremerton | Private<br>2267, 4112 | 200 | |
| Kitsap Lake Water Co.<br>[redacted] (O)<br>Route 1, Box 1829, Bremerton | Private | 700 | 205 |
| Kitsap Lake Water Dist.<br>J. F. Edmonds (M)<br>[redacted] Bremerton | Water District | 487 | 2000 |
| Kitsap Memorial State Park | State | | |
| [redacted]<br>Route 1, Box 1472, Bremerton | Private<br>17242 | | 20<br>(proposed) |
| Little Boston Water System or<br>Port Gamble Indian Reservation Water System<br>A. Purser (M)<br>Star Route, Box 85B, Suquamish | Municipal | 150 | 53 |
| Lynwood Center Water System or [redacted] Wells<br>[redacted] (O)<br>Port Blakely, Bainbridge Island | Private<br>A5490 | | 25 |
| [redacted] (O)<br>[redacted] Bremerton | Private<br>13979, 15376 | | 50<br>(proposed) |
| Madrona Water Company<br>H. Van Wyck (M)<br>Box 123, Bainbridge Island | Private | 70 | 20 |
| [redacted]<br>5814 - 22nd N.W., Seattle<br>(Proposed development at Holly) | Private<br>17381 | | 10<br>(proposed) |
| Manchester Water Dist.<br>E. L. Dagnie (M)<br>Box 152, Manchester | Water District<br>A372, A373, A5640 | 1000 | 320 |
| Manitou Park Water Works<br>[redacted] (O)<br>Route 2, Box 2508, Winslow | Private | 148 | 42 |
| Manzanita Heights Water Supply<br>D. Stuart (M)<br>Route 1, Box 1731, Bainbridge Island | Private | 70 | 20 |
| [redacted], Seattle<br>(serves Nellita) | Private<br>16837 | | 5 |
| F. W. McChesney (M)<br>Everett<br>(serves South Beach) | Private<br>3006 | | 20 |
| Meadowdale Water Dist.<br>E. H. Lacy (M)<br>Route 4, Box 2086, Bremerton | Water District | | |
| Meadowdale Water System<br>J. Reed (M)<br>Route 4, Box 2021, Bremerton | Private | 70 | 20 |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| | Unnamed stream | | | | |
| 0 | Dickenson Creek and E. F. Dickenson Creek | | | 165,000 | |
| 0 | 2 streams | | | | Disinfected with hypochlorites |
| | Purchase from Bremerton | | | | |
| | Well | | 315 | | |
| | Unnamed stream | | | 5,000 | |
| 0 | Well & unnamed stream (aux.) | 115,000 | | 100,000 | Disinfected with hypochlorites |
| | 2 wells | | | | |
| | 2 unnamed streams | | | 22,000 | |
| | Well | | | | |
| | Unnamed spring | | | | |
| 320 | 3 wells | 12,000 | | 200,000 | |
| | Well | | | | |
| | Well | | | | |
| | Nellita Creek & unnamed stream | | | 1,500 | |
| | Unnamed stream | | | | |
| 20 | 2 wells | | 390 | 4,800 | |

| System Name<br>Owner (O), Supt. (S), Manager or other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application Number<br>(A - Ground water, R - Reservoir) | Estimated 1962<br>Connected Population | Number of<br>Services |
|---|---|---|---|
| KITSAP COUNTY--Continued | | | |
| Merritt Water Supply<br>E. W. Merritt (O)<br>Route 1, Box 1082, Bremerton | Private<br>5324 | 70 | 20 |
| [redacted] (O)<br>Route 2, Box 460, Bremerton | Private<br>3644 | | 2<br>(several cabins proposed) |
| Minnig Water Supply<br>M. Minnig (O)<br>Seabeck | Private | 50 | 20 |
| Mission View Water System<br>[redacted] (O)<br>Port Orchard | Private | | |
| Monroe Point Water Company<br>E. Eliason (M)<br>Route 2, Box 2621, Bainbridge Island | Private<br>A6208 | | 18 |
| [redacted] (O)<br>Route 2, Box 2455, Bainbridge Island | Private<br>16973 | | 10<br>(proposed) |
| Mountaineers Water System<br>The Mountaineers Inc. (O)<br>523 Pike Street, Seattle | Private<br>16341 | | 5 |
| North Perry Avenue Water District<br>H. B. Van Sickle (M)<br>2921 Perry Avenue, Bremerton | Water District<br>A3781, A4139, A5258 | 4,000 | 1,280 |
| Olson Water System<br>[redacted] (O)<br>Box 264, Bainbridge Island | Private<br>17716 | | 4 |
| Olympic Homes Company<br>G. C. Coryell (M)<br>[redacted] Seattle | Private<br>15735 | | 50<br>(proposed) |
| Olympic View Water System<br>O. E. Jensen (M)<br>Bremerton, Washington | | | |
| Orchard Beach Water Company<br>G. S. Kirk (M)<br>Hansville | Private | 70 | 20 |
| Orchard Point Naval Fuel Depot Water System<br>U.S.N. Public Works Office<br>Manchester | U.S. | | |
| Phinney Bay Water District<br>N. E. Lytle (M)<br>[redacted] Bremerton | Water District | | |
| Point No Point Water System<br>S. A. Johnson (M)<br>Hansville | Private | | (serves resort and cabins) |
| Port Blakely Country Club Water System<br>J. P. Haley (M)<br>Box 516, Port Blakely, Bainbridge Island | Private | 120 | 40 |
| Port Blakely Water System<br>Port Blakely Mill Co. (O)<br>Port Blakely, Bainbridge Island | Private | 50 | 14 |
| Port Gamble Water System<br>Pope and Talbot Inc. (O)<br>Port Gamble | Municipal<br>A4711 | 350 | 100 |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Gravity | Treatment |
|---|---|---|---|---|---|
| | Unnamed stream | | | 10,000 | |
| | Unnamed stream | | | | |
| | Well | | | | |
| | Well | | | | |
| | Well | | | | |
| | Unnamed stream and springs | | | | |
| | Unnamed stream | | | | |
| 1,280 | 3 wells | 175,000 | | 350,000 | Disinfected with chlorine gas (stand by) |
| | Unnamed stream | | | | |
| | 3 unnamed springs | | | | |
| | Unnamed spring | | | | |
| | Purchase from Bremerton | | | | |
| | Unnamed stream | | | | |
| | Unnamed stream | | | | |
| 0 | Unnamed stream | | | | |
| 0 | 5 springs and well | | 100,000 | 485,000 | Disinfected with chlorine gas |

| System Name<br>Owner (O), Supt. (S), Manager or other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application No.<br>(A - Ground water, R - Reservoir) | Estimated 1962<br>Connected population | Number of<br>Services |
|---|---|---|---|
| KITSAP COUNTY --continued | | | |
| Port Madison Water Company<br>W. J. Orr (M)<br>Route 2, Box 2689, Bainbridge Island | Private | 160 | 50 |
| Port Orchard<br>G. Givens (S)<br>City Hall | Municipal<br>A4166, A6132 | 5,000 | 920 |
| Poulsbo<br>C. Paulson (S)<br>City Hall | Municipal<br>5585, 11528, 16431 | 1,600 | 450 |
| Priddy Vista Water System<br>(b) (6) (O)<br>Seabeck | Private<br>A4622 | | 37<br>(proposed) |
| Randsville Water Users<br>(b) (6)<br>Route 1, Box 1094A, Bremerton | 8930 | 42 | 12 |
| (b) (6) (O)<br>Route 2, Box 208, Poulsbo<br>(Serves Vinland Park area) | Private<br>A5536 | | 4 |
| (b) (6) (O)<br>Route 1, Box 1386, Bremerton | Private<br>6786 | | 4 |
| (b) (6) (O)<br>Route 1, Box 487, Port Orchard | Private<br>14358 | | 4 |
| Rhododendron Heights Water System<br>G. M. Brigham (M)<br>Route 1, Box 1396, Bremerton | Private | 100 | 20 |
| Rich Cove Water System<br>(b) (6) (O)<br>Box 223, Gig Harbor | Private<br>13406 | 40 | |
| Rockaway Beach Water Supply<br>A. Raber (M)<br>Port Blakely, Bainbridge Island | | | |
| Rolling Bay Water Co.<br>(b) (6) (O)<br>Bainbridge Island | Private<br>7084 | 350 | 100 |
| Ross Water Supply System<br>(b) (6) (O)<br>Route 4, Box 2290, Bremerton | Private<br>A5436 | 70 | 20 |
| Sandy Hook Park Water System<br>P. D. Coles (M)<br>855 Empire Building, Seattle | Municipal<br>4049 | | |
| Sandy Hook Water Company<br>T. Finlay (M)<br>Route 1, Box 750, Poulsbo | Private | 150 | 68 |
| Scandia Water Works Company<br>R. C. Iversen (M)<br>Route 3, Box 627, Poulsbo | Private<br>3859, 17363 | | 15 |
| Seabeck Conference Ground Water System<br>K. B. Colman (M)<br>1100 Olive Way, Seattle | Private | | |
| (b) (6) (O)<br>Box 32, Hansville | Private<br>A5189 | | 6<br>(proposed) |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| 0 | Springs | 250,000 | 250,000 | 65,000 | |
| 920 | 4 wells | 506,000 | 50,000 | 350,000 | |
| 350 | 3 unnamed springs and unnamed stream | | 806,000 | 1,000,000 | |
| | Well | | 525 | | |
| | Unnamed stream | | | 10,000 | |
| | Well | | | | |
| | Dickenson Creek | | | | |
| | Curley Creek | | | | |
| 0 | Unnamed spring and stream | 10,000 | 1,500 | | |
| | Unnamed stream | | | 50,000 | |
| 50 | 7 unnamed springs | | 72,000 | 65,000 | Disinfected with hypochlorites |
| | Well | | | | |
| | Unnamed springs | | | | |
| 0 | Well, springs (aux.) | | | 27,000 | |
| | Scandia Creek | | | | |
| | 2 springs | | | 3,000 | |
| | Well | | | | |

| System Name<br>Owner (O), Supt. (S), Manager or other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application No.<br>(A - Ground water, R - Reservoir) | Estimated 1962<br>Connected population | Number of<br>Services |
|---|---|---|---|
| KITSAP COUNTY--Continued | | | |
| (b) (6) [redacted] et al (O)<br>Keyport | Private<br>5007 | | 3 |
| Silver Beach Community Water Supply<br>G. Obenshain (M)<br>Route 4, Box 2382, Bremerton | | 70 | 20 |
| Silverdale Water District No. 16<br>L. R. Scheschy (M)<br>Route 1, Box 73, Silverdale | Water District<br>1306, 3816, 13084, 16361 | 1,500 | 375 |
| South Bainbridge Water Company<br>Roats and Rodal (M)<br>Box 445, Poulsbo | Private<br>17514, 17515 | 150 | 40 |
| South Blakely Water Association<br>Port Blakely, Bainbridge Island | Water Association | | |
| (b) (6) [redacted] (O)<br>Route 5, Box 1094, Bremerton | Private<br>A5246 | | 10 |
| Sunny Cove Water System<br>(b) (6) [redacted] (O)<br>Box 301, Gig Harbor | Private | | |
| Sunnyslope Water District<br>S. O. Johnson (M)<br>Route 4, Box 146, Port Orchard | Water District<br>A2414, A4777 | 400 | 97 |
| Suquamish Improvement Company Water System<br>M. Kettering (M)<br>Suquamish | Private<br>D111, A120 | 700 | 225 |
| Suquamish Water CoOp<br>H. Steenbock (M)<br>Suquamish | Private | | |
| Surfrest Water System<br>Jensen, Richards & Olhava (O)<br>Box 805, Poulsbo | Private<br>A5131 | 70 | 20 |
| (b) (6) [redacted] (O)<br>Manette | Private<br>5609 | | 4 |
| Tracyton Water District<br>E. E. Riddell (M)<br>Tracyton | Water District<br>5811 | 350 | 113 |
| Triangle Water System<br>Triangle Motel (O)<br>Gorst | Private | | |
| Union High School District No. 5 and<br>Kitsap County Sunnyview Home<br>Port Orchard | School<br>3081 | | School and<br>county home |
| View Side Community Water System<br>A. Gross (S)<br>Box 566, Poulsbo | Private<br>6177 | 60 | 18 |
| (b) (6) [redacted] (O)<br>Route 3, Box 33, Poulsbo | Private<br>5060 | | 4 |
| Washington Congregational Christian Conference<br>R. H. Hook<br>720 - 14th Avenue North, Seattle | Private<br>A4204 | | (camp) |
| Washington State Veterans Home Water System<br>D. E. Willson (S)<br>Retsil | State | 450 | 1 |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| | Unnamed stream | | | | |
| | Well | | | | |
| | Woods Creek & Unnamed stream | 338,000 | | 150,000 | |
| | 2 Unnamed springs | | | | |
| | Well | | | | |
| | Well | | | | |
| 97 | 2 Wells | 40,000 | | 25,000 | |
| 225 | 2 Wells | 16,000 | | 225,000 | |
| | 2 Wells | | | | |
| | Unnamed spring | | | | |
| 113 | Unnamed stream | 50,000 | | 50,000 | Disinfected with hypochlorites |
| | Annapolis Creek | | | | |
| | Johnson Creek | | | 10,000 | |
| | Unnamed stream | | | | |
| | Well | | | | |
| 0 | 3 Streams | 70,000 | | 250,000 | Disinfected with chlorine gas |

| System Name<br>Owner (O), Supt. (S), Manager or other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application No.<br>(A - Ground water, R - Reservoir) | Estimated 1962<br>Connected population | Number of<br>Services |
|---|---|---|---|
| KITSAP COUNTY--Continued | | | |
| Watauga Beach Community Water Company<br>F. Comstock (M)<br>Route 6, Box 331, Port Orchard | Private<br>A3497 | 400 | 48 |
| White's Well Supply<br>[redacted] (O)<br>Hansville | Private | 70 | 20 |
| Wing Point Water Service<br>R. D. Biddison (M)<br>Route 2, Box 2168, Bainbridge Island | Private<br>A4645 | 350 | |
| Winslow<br>W. H. Riley (S)<br>City Hall, Box 52, Winslow | Municipal<br>A4780, A4781, A6314, 14865 | 1,000 | 300 |
| Wye Lake Water System<br>J. E. Swanson (M)<br>Seattle | Private | | |
| Yeomalt Water Supply<br>J. Reid (M)<br>Route 2, Box 2293, Bainbridge Island | | 70 | 20 |
| KING COUNTY | | | |
| [redacted] (O)<br>Burton | Municipal<br>2376 | | |
| Bachelor Water System, Inc.<br>W. E. Bachelor (M)<br>Route 1, Burton | Private<br>5896 | | 9 |
| Bard and Howard (O)<br>Vashon | Private<br>A6019 | | 125<br>(proposed) |
| Beulah Park Water System<br>Cove, Vashon Island | Private | | |
| Biloxi Water System<br>H. S. Huff (M)<br>Vashon Island | Private<br>12455 | 24 | 7 |
| [redacted] (O)<br>Box 245, Mercer Island<br>(Serves area adjacent to Magnolia Beach, Vashon Island) | Private<br>A5721 | | 50<br>(proposed) |
| Burton Water Co-Op<br>G. R. Garrison (S)<br>Route 1, Box 284, Vashon | Co-Op | 750 | 250 |
| Burton Water System<br>[redacted] (O)<br>Burton | Private | | |
| Cedarhurst Canyon Water System<br>Vashon Island | Private | 400 | 122 |
| Colvos Heights Water System<br>A. Goedecke (M)<br>12012 - 1st Avenue, N.W., Seattle | Private | | 26<br>(proposed) |
| Dillworth Community Water System<br>S. Tallakson (M)<br>Vashon | | | |
| Dillworth Point Club Water System<br>O. Kirschner (S)<br>Dillworth (Beals) Point, Vashon | | | 22 |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Gravity | Treatment |
|---|---|---|---|---|---|
| 48 | Well | 8,000 | | 25,000 | |
| | Well | | | | |
| | Well | | | | |
| 300 | 3 wells & unnamed stream | 100,000 | | 150,000 | Disinfected with hypochlorites (stand by) |
| | Well | | | | |
| | Unnamed spring | | | | |
| | Unnamed springs | | | | |
| | Well | | | | |
| | Unnamed springs | | | | |
| | Unnamed spring | | | 1,000 | |
| | Well | | | | |
| 250 | 2 wells & springs | 20,000 | | 60,000 | |
| 122 | Cedarhurst Creek | | | 20,000 | Disinfected with hypochlorites |
| | Springs | | | | |
| | Unnamed stream | | | | |

| System Name<br>Owner (O), Supt. (S), Manager or other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application No.<br>(A - Ground water, R - Reservoir) | Estimated 1962<br>Connected population | Number of<br>Services |
|---|---|---|---|
| KING COUNTY--Continued | | | |
| Dockton Improvement Co. Water System<br>S. Nilsen (M)<br>Dockton | Private<br>4477 | 200 | 70 |
| Ellisport Water Company<br>(b) (6) [redacted] (O)<br>Route 2, Box 421, Vashon | Private | 280 | 80 |
| Glen Acres Community Water System<br>Vashon | Private | | |
| (b) (6) [redacted] (O)<br>Vashon | Private<br>11653 | | 3 |
| Heights Water Co-Op<br>A. C. Harrington (M)<br>Vashon Heights | Co-Op | 440 | 175 |
| Heights Water Corporation<br>J. G. Bennett (M)<br>Vashon | Private<br>3158, 3324 | 620 | 190 |
| Hillside Mutual Water System<br>Glen Acres, Vashon | | | |
| Island Mutual Water Co-Op<br>Vashon Island | Co-Op | 1,000 | 225 |
| Island Mutual Water System<br>O. Therkelsen (S)<br>Route 2, Vashon | Private<br>1925 | 600 | 175 |
| (b) (6) [redacted] (O)<br>Dockton | Private<br>10800 | | |
| King County Water District No. 19<br>W. J. Blekkink (S)<br>Route 2, Box 611, Vashon | Water District<br>1490 | 1,030 | 315 |
| Luana Vue Water System<br>D. Spano (M)<br>Route 2, Box 30D, Vashon | Private<br>A6281 | | 25<br>(proposed) |
| Magnolia Beach Add. Supply<br>S. Wilson (S)<br>Burton | | | 8 |
| Maury Mutual Water Company<br>T. Revelle (M)<br>Route 1, Burton | Co-Op<br>13088 | 180 | 50 |
| D. A. McIntyre, et al (M)<br>Route 2, Box 168, Burton | Private<br>A1526, A1527, A6395 | | 24<br>(proposed) |
| Neighborhood Club of Sylvan Beach<br>Vashon | Private<br>4500 | | 13 |
| North Vashon Water System<br>Vashon Island | Private | | |
| Quartermaster Cove Water Supply<br>O. J. Vincent (M)<br>(b) (6) [redacted] Seattle | A5644 | | 40<br>(proposed) |
| Quartermaster Heights Water System<br>A. Goedecke (M)<br>(b) (6) [redacted] Seattle | | | 33<br>(proposed) |
| Sandy Beach Club Water System, Inc.<br>G. E. Stevenson (M)<br>2126 - 3rd Avenue, Seattle | Private<br>A1651 | | |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| 70 | Unnamed springs & stream | 19,000 | | 14,000 | |
| 80 | Springs | 20,000 | | 16,000 | Disinfected with hypochlorites |
| | Unnamed streams | | | 50,000 | |
| | Well | | | | |
| 190 | Unnamed spring | 38,000 | | 20,000 | |
| 225 | Springs | 100,000 | | 50,000 | Disinfected with hypochlorites |
| 175 | Unnamed stream | | | 30,000 | |
| | Unnamed stream | | | | |
| 315 | Beall Creek | | | 20,000 | Disinfected with hypochlorites |
| | Well | | 100 | | |
| | Spring | | | | |
| 50 | Unnamed springs | | | 400,000 | |
| | 3 wells | | | | |
| | 3 unnamed springs | | | 7,000 | |
| | Infiltration trench, unnamed stream and spring | | | | |
| | Well | | | 10,000 | |

| System Name<br>Owner (O), Supt. (S), Manager or Other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application Number<br>(A - Groundwater, R - Reservoir) | Estimated 1962<br>Connected Population | Number of<br>Services |
|---|---|---|---|
| KING COUNTY - continued | | | |
| (b) (6) [redacted] et al (O)<br>Burton | Private<br>7264 | | 3 |
| South Manzanita Beach Water Association<br>Docton | Water association | | |
| Stone Water Supply<br>J. Henion (M)<br>Vashon | | 25 | 7 |
| West Side Water Company<br>J. E. Beardsly, Jr. (M)<br>Box 267, Vashon | Private<br>2339, A6585 | 600 | 130 |
| Wise Investment Company, Inc.<br>R. A. Wise (M)<br>Route 1, Box 324, Vashon | Private<br>13617, A5396 | | 50<br>(proposed) |
| PIERCE COUNTY | | | |
| Amsterdam Bay Water Company<br>M. E. Gordon (M)<br>Vega, Anderson Island | Private<br>13047 | | 10 |
| Anderson Island Water Company<br>Vega, Anderson Island | | | |
| Baty Water System<br>(b) (6) [redacted] (O)<br>4801 South Orchard Street, Tacoma | Private<br>A6652 | | 18<br>(proposed) |
| Conboy Tracts Water System<br>(b) (6) [redacted] (O)<br>Longbranch | Private<br>A325 | | 6 |
| Corbit Water System, Inc.<br>W. H. Corbit (M)<br>Rosedale | | | |
| Echo Bay Company, Inc.<br>A. W. Nederwold (M)<br>Fox Island | Private<br>A5230 | | 12 |
| Filucy Bay Water Company<br>806 Washington Building, Tacoma | | | |
| Forest Beach Water Service, Inc.<br>F. Schumacher (M)<br>Route 1, Gig Harbor | Private | 150 | 60 |
| Fox Island Water Company, Inc.<br>F. H. Nichols (M)<br>Fox Island | Private<br>A5362 | 25 | |
| Gig Harbor<br>H. E. Oakley (S)<br>City Hall, Gig Harbor | Municipal<br>A1015, A6570 | 1,200 | 350 |
| Gig Harbor Water District<br>M. Gustafson (M)<br>Gig Harbor | Water district | | |
| (b) (6) [redacted] (O)<br>Vega | Private<br>13047 | | 10<br>(proposed) |
| Harbor Springs Water Company<br>J. H. Bickel (M)<br>Route 2, Box 489, Gig Harbor | Private<br>A5483, 9562 | 175 | 53 |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Gravity | Treatment |
|---|---|---|---|---|---|
| | Unnamed springs | | | | |
| | Stream | | | | |
| 120 | Needle (Cedarhurst) Creek, Unnamed spring, well & infiltration trench | | | 20,000 | |
| | Unnamed stream and well | | | | |
| | Unnamed springs | | | | |
| | Well | | | | |
| | Well | | 1,000 | | |
| | Well | | | | |
| | 2 wells | | | | |
| | 2 wells | | 1,000 | | |
| | 2 wells | | | | |
| | Unnamed springs | | | | |
| | Unnamed spring and well | | | 24,000 | |

| System Name<br>Owner (O), Supt. (S), Manager or Other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application Number<br>(A - Groundwater, R - Reservoir) | Estimated 1962<br>Connected Population | Number of<br>Services |
|---|---|---|---|
| PIERCE COUNTY - continued | | | |
| Herron Maintenance Company<br>A. Kirk (M)<br>Box 126, Lake Bay | Private<br>A6551 | | 150 |
| Ketron Island Water System<br>(b) (6) [redacted] (O)<br>Box 428, Steilacoom | Private<br>A4436 | | 5 |
| Kopachuck State Park | State | | |
| (b) (6) [redacted] (O)<br>Star Route, Box 593, Gig Harbor | Private<br>14838 | | 5 |
| McNeil Island Water System<br>W. W. Bowlin (S)<br>Steilacoom | U.S. | | |
| (b) (6) [redacted] (O)<br>Fox Island | Private<br>16322 | | 10<br>(proposed) |
| North Gig Harbor Water Company<br>(b) (6) [redacted] (O)<br>(b) (6) [redacted] Tacoma | Private<br>D386 | 600 | |
| Northwest Bible Schools, Inc.<br>C. D. Weyerhaeuser (M)<br>Box 488, Tacoma | Private<br>10432 | | (camp) |
| Olympic Shore Water Cooperative<br>H. L. Thompson (M)<br>Star Route, Gig Harbor | Co-op | | |
| (b) (6) [redacted] (O)<br>Fox Island | Private<br>16307 | | 30<br>(proposed) |
| Penrose Point State Park | State | | |
| Quistorff Water Company<br>(b) (6) [redacted] (O)<br>Star Route, Box 548, Gig Harbor | Private<br>9511 | | 30 |
| J. N. Rusu (M)<br>Box 235, Gig Harbor | Municipal<br>A6213, R17178 | | (proposed<br>community) |
| Shore Acres Water Company<br>L. Thrash (M)<br>RFD 2, Gig Harbor | Private<br>A515 | 120 | |
| Shore Acres Water District<br>Gig Harbor | Water district<br>3272 | | |
| Shorewood Beach Water Company, Inc.<br>R. B. McCreadie (M)<br>Fox Island | Private | | |
| Sylvan Light and Water Company<br>Fox Island | Private | | |
| Thornton Water System<br>(b) (6) [redacted] (O)<br>(b) (6) [redacted], Seattle | Private<br>A6540 | | 60<br>(proposed) |
| View Point Addition Water System<br>(b) (6) [redacted] (O)<br>Gig Harbor | Private | 60 | 20 |
| (b) (6) [redacted] (O)<br>Route 2, Box 2198, Gig Harbor | Private<br>5616, A923 | | 125<br>(proposed) |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| | Well | | | | |
| | Well | | | 10,000 | |
| | Well | | 1,000 | | |
| | Unnamed spring | | | | |
| | Unnamed springs | | | | |
| | Well | | | | |
| | Unnamed spring | | | | |
| | Unnamed springs | | | | |
| | Well | | 1,000 | | |
| | Unnamed spring | | | | |
| | Well | | | | |
| | Well | | | | |
| | Unnamed springs | | | 12,000 | |
| | Well | | | | |
| | Well and unnamed stream | | | | |

DNR-00005609

| System Name<br>Owner (O), Supt. (S), Manager or Other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application Number<br>(A - Groundwater, R - Reservoir) | Estimated 1962<br>Connected population | Number of<br>Services |
|---|---|---|---|
| PIERCE COUNTY - continued | | | |
| Westbridge Estates Water Company<br>R. E. Stouffer (M)<br>1221 Puget Sound Bank Building, Tacoma | Private<br>A5385 | | 39<br>(proposed) |
| [redacted] (O)<br>[redacted] Tacoma | Private<br>16258 | | 6<br>(proposed) |
| Wollochet Harbor Water System<br>D. C. Rowland (M)<br>[redacted] Tacoma | Private<br>A2771, A3833, A5194 | 400 | |
| MASON COUNTY | | | |
| Bear Cat Water Corporation<br>W. Koehler (M)<br>Route 1, Belfair | Private<br>6831 | 200 | 15 |
| Belfair State Park | State | | |
| Belfair Water Company<br>K. F. Matz, (M)<br>Box 74, Belfair | Private<br>10857 | | 36 |
| Broadview Beach Tracts<br>[redacted] (O)<br>[redacted] Bremerton | Private<br>16861 | | 15 |
| Cady's Sunrise Beach Tracts<br>R. I. Sande (S)<br>Star Route 2, Box 990, Belfair | | | |
| Cherokee Strip Water Association<br>E. Harriss (M)<br>Route 2, Belfair | | | 15 |
| Clifton Beach Tracts Co-Op Water Association<br>M. Hart (M)<br>Star Route 2, Box 605, Belfair | Water association<br>A4919, 5322, 5614 | | 50 |
| Clifton Pebble Beach Water District<br>E. Beaberet<br>Star Route 2, Box 631, Belfair | Water district<br>5440 | | 30 |
| [redacted] (O)<br>Box 68, Belfair | Private<br>5704 | | 4 |
| D.G.T.G.O.C. Water System, Inc.<br>J. Toynbee (M)<br>[redacted] Tacoma | | | |
| Great Bend Waterfront Tracts, Inc.<br>E. M. Hall (M)<br>Tahuya | Private<br>8503, 8504, 8505, 8506 | | 200<br>(proposed) |
| [redacted] (O)<br>Tahuya | Private<br>17498 | | 4 |
| [redacted] (O)<br>Box 13, Tahuya | Private<br>11780 | | 9 |
| [redacted]<br>Tahuya<br>(Serves part of Great Bend Waterfront Tracts and other homes in Tahuya) | Private<br>8300, 8301 | | 20 |
| Johnson Creek Water Users Association<br>Belfair | 4641 | | |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| | Well | | | | |
| | 2 unnamed springs | | | | |
| | 4 wells | | | | |
| | Sweetwater Creek | | | | Disinfected with hypochlorites |
| | 3 wells | | 630 | | |
| | Unnamed spring | | | 3,000 | |
| | 2 unnamed springs | | | 2,000 | |
| | Unnamed stream | | | | |
| | Well | | | | |
| | Well, unnamed spring & stream | | | | |
| | Unnamed springs | | | | |
| | Unnamed stream | | 150 | | |
| | Hall, Hoddy, Fay, Browns, and West Creeks and unnamed springs | | | | |
| | Hall Creek and 2 unnamed springs | | | | |
| | Unnamed stream | | | 1,200 | |
| | Unnamed stream and springs | | | 4,000 | |
| | Johnson Creek | | | | |

| System Name<br>Owner (O), Supt. (S), Manager or Other Official (M)<br>Location or Address | Type of Ownership<br>Water Right Application Number<br>(A - Groundwater, R - Reservoir) | Estimated 1962<br>Connected population | Number of<br>Services |
|---|---|---|---|
| MASON COUNTY - continued | | | |
| (b) (6) [redacted]<br>Box 344, Port Orchard<br>(Proposed development along Hood Canal, 4 miles north of Dewatto) | Private | | 10<br>(proposed) |
| D. Lesco, et al (M)<br>Route 2, Bremerton | Private<br>5045 | | 5 |
| Lynwood Beach Water Association<br>R. D. Nelson (S)<br>Box 377, Belfair | Water association<br>A6002 | | 9 |
| (b) (6) [redacted] (O)<br>Tahuya | Private<br>2832 | | |
| Madrona Morningside Beach Water Association, Inc.<br>A. W. Luxton (M)<br>Route 2, Box 1073, Belfair | Water association<br>A5758 | | 26 |
| McFarland's Tract Water Supply<br>Tveten (M)<br>Sandy's Resort, Tahuya | | | 12 |
| Mt. Rainier Council Boy Scouts of America<br>H. R. West (M)<br>306 South 7th Street, Tacoma | Private<br>14657 | | (camp<br>supply) |
| Nelson's Waterfront Tracts Community Water System<br>(b) (6) [redacted] (O)<br>Tahuya | | | 18 |
| North Belfair Community Water Company<br>A. Pope (M)<br>Box 257, Belfair | Co-op<br>7635 | 100 | 37 |
| Pleasant Cove Water Association<br>W. R. Lyman (M)<br>Route 2, Belfair | Water association<br>6392 | | 24 |
| Shore Hills Estates Water Supply<br>Ericksen Construction Company<br>Box 14A, Silverdale | Private<br>16110 | | 6 |
| (b) (6) [redacted] (O)<br>Belfair | Private<br>5015 | | 20 |
| Wagon Wheel Water System<br>(b) (6) [redacted] (O)<br>Route 2, Box 623, Belfair | Private<br>A5899 | | 12 |
| (b) (6) [redacted] (O)<br>Tacoma<br>(Serves part of Cady's Sunrise Beach) | Private<br>3747 | | 6 |
| Washington State Department of Institions<br>Mission Creek Youth Forest Camp | State<br>A5757 | | (forest<br>camp) |

| Number of Meters | Sources of Supply | Average Daily Usage - GPD | Distribution Storage - Gallons Non-Gravity | Distribution Storage - Gallons Gravity | Treatment |
|---|---|---|---|---|---|
| | Unnamed stream | | | | |
| | Lesco Creek | | | | |
| | Well | | | | |
| | Unnamed stream | | | | |
| | Springs and well | | | | |
| | Unnamed springs | | | | |
| | Robbins Lake & unnamed springs | | | | |
| | Well | | | | |
| | Unnamed stream | | | | |
| | Unnamed springs | | | | |
| | Unnamed springs | | | 40,000 | |
| | Unnamed stream | | | | |
| | Spring and well | | | | |
| | Unnamed stream | | | | |
| | Well | | | | |

## APPENDIX C

Appendix C lists all the recorded ground-water filings in the study area as of January 1, 1963.

These filings are listed according to township and the first column lists them by sections within the township. The next three columns refer to the application, permit, and certificate numbers of a particular filing. The letter "D" in these numbers indicates the filing is a Declaration and use is claimed prior to June 6, 1945. The letter "A" indicates an application filed after that date. The term "Rejected" in the permit column or "Canc." (Cancelled) in the certificate column shows that the filing is no longer valid due to the applicant's disinterest, his failure to comply with statutory provisions, or rejection by the Division of Water Resources. The absence of a number in a column indicates that an application has not yet progressed to permit status or has not been perfected to certificate. The priority column indicates the date upon which the application was received or the date of use claimed in the case of a declaration; thus determining its priority relative to other rights which may affect or be affected by it.

The next column, "Name," refers to the name of the applicant, permittee, or original holder of the certificate, and does not necessarily refer to the present holder of the right or owner of the land. Once a certificate of water right is issued, it becomes appurtenant to the land, and the Division of Water Resources does not retain records of changes of ownership.

The quantity column lists both the rate of water withdrawal in gallons per minute and the total annual withdrawal in acre-feet per year permissible under each right. Quantities in parentheses are conjectural since these filings have not been perfected and are invalid.

The column, "Well Loc," refers to the smallest recorded subdivision in which the well is located.

The column, "Use," shows the specific utilization under the right, and in the case of irrigation, lists the number of acres. The following abbreviations are used in this column.

Ac. ---------------------- Acres
Com. Dom. --------------- Community Domestic
Group Dom. --------------- Group Domestic
Dom. ---------------------- Domestic
Fire Prot. ---------------- Fire Protection
Irr. ---------------------- Irrigation

## APPENDIX C

### GROUND WATER RIGHTS ON RECORD WITH THE DIVISION OF WATER RESOURCES AS OF JANUARY 1, 1963

| Sec. | Appl. | Permit | Cert. | Priority | Name | Quantity GPM | Quantity Ac-Ft/Yr | Well Loc. | Use |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | **T. 19 N., R. 1 E.W.M.** | | | | |
| 2 | A4436 | 4152 | 3528A | 9-17-56 | (b) (6) [redacted] | 200 | 200 | Govt. Lot 3 | Com. Dom. |
| | | | | | **T. 20 N., R. 1 W.W.M.** | | | | |
| 1 | A4430 | 4187 | 4218A | 9-6-56 | (b) (6) [redacted] | 180 | 36 | Govt. Lot 2 | Irr. 18 Ac. |
| 11 | A3986 | 3787 | 2478A | 5-5-55 | Peninsula School Dist. No. 401 | 100 | 10.08 | NENW | Dom. supply for school |
| 24 | A 325 | 498 | 1588A | 7-31-46 | (b) (6) [redacted] | 33 | 21 | Govt. Lot 4 | Com. Dom. |
| 27 | A5803 | 5481 | | 1-11-61 | | 50 | 5.6 | Govt. Lot 3 | Dom. |
| | | | | | **T. 20 N., R. 2 E.W.M.** | | | | |
| 6 & 7 | A5362 | 5004 | | 8-10-59 | (b) (6) [redacted] | 100 | 22.4 | SWSW of Sec. 6 | Com. Dom. |
| 7 | A5473 | 5213 | 3683A | 1-25-60 | | 8 | 5.6 | SWNE | Dom. & Stock |
| | | | | | **T. 21 N., R. 1 W.W.M.** | | | | |
| 2 | A3985 | 3786 | 2477A | 5-5-55 | Peninsula School Dist. No. 401 | 30 | 13.5 | Govt. Lot 2 | Dom. supply for school |
| 32 | A6551 | | | 11-15-62 | Herron Maintenance Company | 500 | 432 | NESW | Com. Dom. |
| 34 | A6213 | 5845 | | 3-13-62 | (b) (6) [redacted] et al | 100 | 160 | NWSE | Com. Dom., Recreation, & Beautification |
| | | | | | **T. 21 N., R. 1 E.W.M.** | | | | |
| 2 | A6120 | 5786 | 4171A | 12-4-61 | (b) (6) [redacted] | 25 | 5.6 | SWSE | Dom. |
| 11 | A5344 | 5001 | Canc. | 7-24-59 | | (85) | | NENE | Irr. 7.5 Ac. & Dom. |
| 27 | A4039 | 3768 | 2351A | 6-24-55 | Tacoma DeMolay Boys Club | 6 | 5.6 | Govt. Lot 6 | Dom. & Recreational |
| 27 | A5580 | 5329 | Canc. | 4-26-60 | (b) (6) [redacted] | (150) | | SWSE | Com. Dom. |
| 35 | A5230 | 4877 | 3671A | 4-27-59 | Echo Bay Co., Inc. | 35 | 11 | Govt. Lot 6 | Group Dom. |
| | | | | | **T. 21 N., R. 2 E.W.M.** | | | | |
| 1 | A1526 | 1391 | 802A | 5-25-50 | (b) (6) [redacted] | 15 | 11 | Govt. Lot 1 | Com. Dom. |
| 1 | A1527 | 1400 | 803A | 5-25-50 | | 25 | 20 | NWSW | Irr. 10 Ac. & Dom. |
| 1 | A5101 | 4780 | 4205A | 1-15-59 | | 14 | 10 | NWSW & Govt. Lot 3 | Irr. 5 Ac. & Dom. |
| 1 | A6395 | 5981 | | 7-26-62 | | 35 | 21.6 | NWSW | Com. Dom. |
| 5 | A2426 | 2228 | 1178A | 4-2-52 | | 35 | 7.5 | Govt. Lot 4 | Dom. |
| 5 | A5483 | 5184 | 3663A | 1-27-60 | Harbor Springs Water Co. | 80 | 36 | NWSE | Com. Dom. |
| 6 | D 386 | | 356D | 1934 | (b) (6) [redacted] | 17 | 18.3 | Govt. Lot 1 | Com, Dom, & Commercial |
| 6 | A6212 | 5868 | | 3-13-62 | Perkins Funeral Home | 50 | 31.6 | NESW | Dom. & Irr. 13 Ac. |
| 8 | A 515 | 623 | 658A | 5-6-47 | Shore Acres Water Co. | 20 | 17 | SWSE | Com. Dom. |
| 8 | A1015 | 996 | 590A | 10-18-48 | Town of Gig Harbor | 400 | 238 | Govt. Lot 2 | Municipal Supply |
| 17 | A6105 | 5763 | 4181A | 11-14-61 | (b) (6) [redacted] | 100 | 80 | NWSE | Dom. & Commercial |
| 20 | A4846 | 4589 | 3203A | 4-30-58 | | 10 | 5.6 | NESW | Dom. |
| 21 | A5385 | 5050 | 4094A | 9-9-58 | Westbridge Estates Water Co. | 35 | 35 | Govt. Lot 1 | Com. Dom. |
| 28 | A 923 | 920 | 2085A | 6-16-48 | (b) (6) [redacted] | 25 | 40 | Govt. Lot 4 | Com. Dom. |
| 30 | A2771 | 2629 | 2007A | 10-21-52 | | 28 | 22.5 | Govt. Lot 1 | Com. Dom. |
| | Certificate of Change 575 | | | | | | | | |
| 30 | A3742 | 3467 | 2063A | 8-24-54 | | 16 | 5.6 | Govt. Lot 2 | Dom. |
| 30 | A3833 | 3708 | 3137A | 1-11-55 | | 15 | 7 | Govt. Lot 1 | Group Dom. |
| 30 & 19 | A5194 | 4933 | 4001A | 4-1-59 | Wollochet Harbor Club & D. C. Rowland | 172 | 60.5 | Govt. Lot 1 of 30 Govt. Lot 4 of 19 | Com. Dom. |

| Sec. | Appl. | Permit | Cert. | Priority | Name | Quantity GPM | Quantity Ac-Ft/Yr | Well Loc. | Use |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | T. 22 N., R. 2 W.W.M. | | | | |
| 1 | A6002 | 5660 | 4357A | 7-25-61 | (b) (6) [redacted] | 60 | 27.9 | Govt. Lot 3 | Com. Dom. |
| 1 | A6496 | Rejected | | 10-1-62 | [redacted] | (5) | | NWNW | Dom. |
| 2 | A5899 | 5545 | | 4-10-61 | [redacted] | 100 | 20.7 | NENE | Com. Dom. |
| 9 | A4919 | 4618 | 3922A | 7-16-58 | Clifton Beach Water Association | 30 | 31 | NWSE | Com. Dom. |
| 11 | A5741 | 5400 | 3840A | 9-19-60 | (b) (6) [redacted] | 20 | 11.2 | Govt. Lot 1 | Dom. |
| | | | | | T. 22 N., R. 1 E.W.M. | | | | |
| 3 | A2455 | 2210 | 1413A | 4-18-52 | (b) (6) [redacted] | 45 | 16 | SESE | Irr. 8 Ac. & Dom. |
| 9 | A 492 | 554 | Canc. | 3-25-47 | [redacted] | (45) | | NENE | Gravel washing |
| 9 | A5918 | 5582 | 4258A | 4-24-61 | [redacted] | 80 | 23.6 | SWNW | Irr. 9 Ac. & Dom. |
| 11 | A4210 | Rejected | | 1-25-56 | [redacted] | (200) | | NESW | Irr. & Dom. |
| 15 | A4721 | 4441 | 3087A | 11-4-57 | [redacted] | 200 | 50 | NWSW | Irr. 25 Ac. & Dom. |
| 24 | A 316 | 390 | 241A | 7-24-46 | Peninsula School Dist. No. 401 | 50 | 48 | NENW | Dom. |
| 24 | A5071 | 4800 | 3476A | 12-1-58 | (b) (6) [redacted] | 165 | 264 | Govt. Lot 2 | Dom. & Commercial |
| 25 | A5780 | 5591 | Canc. | 11-28-60 | [redacted] | (50) | | SESE | Dom. & Commercial |
| | | | | | T. 22 N., R. 2 E.W.M. | | | | |
| 4 | A4949 | 4741 | Canc. | 8-4-58 | (b) (6) [redacted] | (100) | | NENE | Irr. 10 Ac. |
| 13 | A3392 | 3739 | | 8-10-53 | [redacted] | 400 | 80 | NWNE | Irr. 40 Ac. |
| 24 | A5721 | 5470 | | 8-26-60 | [redacted] | 100 | 45 | NWSE | Com. Dom. |
| 31 | A5962 | 5620 | 4352A | 5-23-61 | [redacted] | 50 | 15.6 | Govt. Lot 4 | Irr. 5 Ac. & Dom. |
| 32 | A6570 | | | 12-19-62 | Town of Gig Harbor | 400 | 164 | SESW | Municipal Supply |
| | | | | | T. 22 N., R. 3 E.W.M. | | | | |
| 14 | A2642 | 2491 | 1430A | 7-18-52 | (b) (6) [redacted] | 10 | 5.6 | Govt. Lot 2 | Dom. |
| 14 | A6281 | 5949 | | 5-4-62 | [redacted] | 25 | 225 | Govt. Lot 1 | Com. Dom. |
| 16 | D 31 | | 18D | Oct. 1941 | Queen City Broadcasting Co. | 40 | 30 | SENW | Irr., Dom. & Industrial |
| 20 | A5644 | 5319 | | 6-16-60 | (b) (6) [redacted] | 50 | 44.8 | Govt. Lot 5 | Com. Dom. |
| 21 | A5840 | 5514 | | 2-20-61 | [redacted] | 40 | 8 | Govt. Lot 2 | Irr. 4 Ac. & Dom. |
| 21 | A5528 | 5293 | 4005A | 3-18-60 | [redacted] | 25 | 10 | NESE | Irr. 5 Ac. & Dom. |
| 22 | A5589 | 5259 | 3755A | 5-3-60 | Boise Cascade Corp. | 400 | 640 | Govt. Lot 2 | Manufacturing (sand & gravel) |
| 23 | A5396 | 5115 | | 9-15-59 | Wise Investment Co., Inc. | 35 | 45 | NWNW | Com. Dom. |
| 23 | A5466 | 5243 | 3800A | 1-18-60 | Thirteenth Coast Guard District | 10 | 16 | Govt. Lot 1 | Dom. & Fire Prot. |
| 32 | A6019 | 5739 | | 8-10-61 | Bard and Howard | 200 | 112.5 | NENW | Com. Dom. |
| | | | | | T. 23 N., R. 2 W.W.M. | | | | |
| 13 | A5757 | 5726 | | 10-10-60 | Washington State Dept. of Institutions | 150 | 240 | SENE | Com. Dom. |
| | | | | | T. 23 N., R. 1 W.W.M. | | | | |
| 3 | A1563 | Rejected | | 6-17-50 | (b) (6) [redacted] | (100) | | SENE | Irr. 25 Ac. |
| | | | | | T. 23 N., R. 1 E.W.M. | | | | |
| 1 | A 645 | 651 | 163A | 10-7-47 | (b) (6) [redacted] | 50 | 11.75 | SWNW | Com. Dom. |
| 6 | A4777 | 4602 | | 2-19-58 | Sunnyslope Water District | 300 | 145.6 | SWNW & NWSW | Municipal Supply |
| 7 | A2414 | 2379 | 2403A | 3-25-52 | Sunnyslope Water District | 130 | 135 | Govt. Lot 1 | Com. Dom. |
| 12 | A 556 | 671 | 630A | 6-6-47 | Bethel Community Water System | 20 | 17 | SWSW | Com. Dom. |
| 17 | A3667 | 3474 | 2877A | 6-8-54 | Presbytery of Seattle | 20 | 32 | SWSE | Dom. |

| Sec. | Appl. | Permit | Cert. | Priority | Name | Quantity GPM | Quantity Ac-Ft/Yr | Well Loc. | Use |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | T. 23 N., R. 1 E.W.M. (Continued) | | | | |
| 20 | A4204 | 3946 | 3062A | 1-18-56 | Wash. Congregational Christian Conference | 41 | 14 | NENE | Com. Dom. |
| 23 | A3892 | 3717 | 2304A | 2-25-55 | Morrison Gravel Co. | 50 | 20 | SWSE | Gravel washing |
| 24 | A2044 | 1936 | Conc. | 7-23-51 | (b) (6) [redacted] | (20) | | NENE | Dom., Irr. & Fire Prot. |
| 28 | A3645 | 3418 | | 5-24-54 | [redacted] | 150 | 30 | NESW & NWSE | Irr. 15 Ac. |
| | | | | | T. 23 N., R. 2 E.W.M. | | | | |
| 2 | A2307 | 2185 | 1086A | 1-29-52 | (b) (6) [redacted] | 30 | 48 | Govt. Lot 4 | Industrial & Dom. |
| 2 | A2559 | 2394 | 2201A | 5-14-52 | U.S. Corps of Engineers | 11 | 10 | Govt. Lot 2 | Dom. |
| 7 | A6225 | 5914 | | 3-23-62 | (b) (6) [redacted] | 25 | 43.4 | S½NE | Com. Dom. |
| 15 | A3551 | 3331 | 2310A | 3-23-54 | Tribune Publishing Co. | 20 | 5.6 | SWSW | Dom. & Industrial |
| | | | | | T. 23 N., R. 3 E.W.M. | | | | |
| 7 | A1651 | 1697 | 1241A | 9-6-50 | Sandy Beach Club, Inc. | 12 | 20 | Govt. Lot 4 | Com. Dom. |
| 31 | A4281 | 4182 | Conc. | 4-11-56 | (b) (6) [redacted] | (100) | | NENW | Irr. 30 Ac. |
| | | | | | T. 24 N., R. 1 E.W.M. | | | | |
| 1 | A5258 | 4985 | 4187A | 5-20-59 | North Perry Ave. Water District | 630 | 1008 | NESE | Municipal Supply |
| 2 | A5375 | 5014 | Conc. | 8-31-59 | Tracyton Water District | (500) | | SWNW | Municipal Supply |
| 5 | A3817 | 3707 | 2303A | 12-14-54 | Erlands Point Water Co. | 450 | 672 | SWNW | Com. Dom. |
| 17 | D 1 | | 5D | Sept. 1941 | (b) (6) [redacted] | 70 | 112 | Govt. Lot 6 | Com. Dom. |
| 25 | D 54 | | Conc. | 4-15-44 | Federal Housing Authority | (350) | | NWSE | Municipal Supply |
| 25 | D 55 | | 85D | 4-16-45 | Federal Housing Authority | 350 | 570 | SWNE | Municipal Supply |
| 25 | A 23 | 33 | 352A | 10-3-45 | Annapolis Water District | 2000 | 1620 | SWNW | Municipal Supply |
| 25 | A4166 | 4030 | 3334A | 11-17-55 | Town of Port Orchard | 350 | 560 | NWSW | Municipal Supply |
| 26 | A6132 | 5800 | | 12-14-61 | Town of Port Orchard | 2000 | 900 | W½SE | Municipal Supply |
| 33 | A5570 | 5296 | 3728A | 4-15-60 | City of Bremerton | 450 | 700 | NESW | Municipal Supply |
| | | | | | T. 24 N., R. 2 E.W.M. | | | | |
| 4 | A5490 | 5227 | | 2-2-60 | (b) (6) [redacted] | 500 | 45 | Govt. Lot 5 | Com. Dom. |
| 6 | A4271 | 4010 | Conc. | 4-2-56 | North Perry Ave. Water District | (750) | | SWNW | Municipal Supply |
| 7 | A3781 | 3551 | 2862A | 10-7-54 | North Perry Ave. Water District | 270 | 432 | NWSW | Com. Dom. |
| 7 | A4139 | 3977 | 2865A | 10-21-55 | North Perry Ave. Water District | 365 | 569.6 | NWNW | Municipal Supply |
| 9 | A 39 | 22 | Conc. | 11-1-45 | Watauga Beach Community Water Company | (70) | | NESW | Com. Dom. |
| 16 | A3497 | 3299 | 2680A | 1-28-54 | Watauga Beach Community Water Company | 80 | 90 | NESW | Com. Dom. |
| 17 | A3666 | 3450 | Conc. | 6-7-54 | (b) (6) [redacted] | (300) | | SWSE | Com. Dom. |
| 20 | A5394 | 5029 | 3747A | 9-15-59 | [redacted] | 18.25 | 4 | SWSW | Irr. 2 Ac. & Dom. |
| 22 | A 372 | 316 | 608A | 9-20-46 | Manchester Water District | 250 | 420 | NWSW | Municipal Supply |
| 22 | A 373 | 316 | 608A | 9-20-46 | Manchester Water District | 200 | | SWSW | Municipal Supply |
| 28 | A 262 | 340 | Conc. | 5-31-46 | (b) (6) [redacted] | (125) | | NWSW | Dom. & Irr. |
| 31* | D 53 | | 84D | 11-2-43 | Federal Housing Authority | 325 | 528 | NENE | Municipal Supply |
| 33 | A5640 | 5336 | | 6-16-60 | Manchester Water District | 500 | 800 | Govt. Lot 2 | Municipal Supply |
| 34 | A2458 | 2214 | 1114A | 4-21-52 | (b) (6) [redacted] | 35 | 22 | Govt. Lot 3 | Irr. 2 Ac., Beautification, & Fish Prop. |
| | | | | | T. 25 N., R. 1 W.W.M. | | | | |
| 20 | A4622 | 4412 | 3311A | 6-5-57 | (b) (6) [redacted] | 47 | 56 | NWNW | Com. Dom. |
| 17 & 20 | A5739 | 5633 | Conc. | 9-19-60 | [redacted] | (150) | | SWSW of 17 NWNW of 20 | Com. Dom. |

* Certificate in error, change required.

| Sec. | Appl. | Permit | Cert. | Priority | Name | Quantity GPM | Quantity Ac-Ft/Yr | Well Loc. | Use |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | **T. 25 N., R. 1 E.W.M.** | | | | |
| 1 | A3631 | 3444 | 2112A | 5-19-54 | (b) (6) [redacted] | 20 | 5.6 | NWNW | Dom. |
| 3 | A4984 | 4735 | Canc. | 9-2-58 | [redacted] | (100) | | SESW | Com. Dom. |
| 14 | A6078 | 6074 | | 10-11-61 | [redacted] | 150 | 30 | SWNW | Irr. 15 Ac. |
| 16 | A5436 | 5139 | 3924A | 11-20-59 | [redacted] | 20 | 32 | SESE | Com. Dom. |
| 17 | A4287 | 4093 | 3056A | 4-20-56 | Central Kitsap School Dist. No. 401 | 30 | 25 | NWSE | Irr. 5 Ac. & Dom. |
| 21 | A3389 | 3165 | 2058A | 10-2-53 | (b) (6) [redacted] | 25 | 6.6 | Govt. Lot 3 | Irr. 1 Ac. & Dom. |
| 21 | A3401 | 3181 | 2111A | 10-13-53 | [redacted] | 20 | 8.5 | Govt. Lot 5 | Irr. 1 Ac. & Dom. |
| 22 | A5661 | 5413 | 4188A | 7-12-60 | Bucklin Hill Water Corp. | 8.3 | 13.2 | NENW | Com. Dom. |
| 24 | A5246 | 4983 | 4052A | 5-11-59 | (b) (6) [redacted] | 100 | 9 | E½NE | Com. Dom. |
| 25 | A5327 | 4967 | 3484A | 6-29-59 | [redacted] | 10 | 16 | SWSW | Dom. |
| 25 | A5378 | 5024 | 4195A | 9-1-59 | [redacted] | 50 | 30 | NWSW | Irr. 18 Ac. & Dom. |
| 28 | A1340 | 1514 | 965A | 1-12-50 | [redacted] | 50 | 10 | Govt. Lot 3 | Dom. & Irr. 5 Ac. |
| | | | | | **T. 25 N., R. 2 E.W.M.** | | | | |
| 9 | A5503 | Rejected | | 2-17-60 | (b) (6) [redacted] | (50) | | NWSE | Dom. |
| 10 | A 152 | 220 | Canc. | 2-27-46 | [redacted] | (200) | | SWNW | Irr. 40 Ac. |
| 16 | A4675 | 4398 | 3952A | 9-9-57 | [redacted] | 55 | 50 | NESW | Irr. 25 Ac. & Fire Prot. |
| 26 | D 1075 | | 1011D | 8-1-30 | [redacted] | 7 | 11 | SENE | Com. Dom. |
| 26 | A 7 | 128 | Canc. | 8-13-45 | [redacted] | (4) | | SENE | Com. Dom. |
| 26 | A 283 | 529 | 83A | 6-18-46 | City of Seattle Housing Authority | 30 | 20 | Govt. Lot 4 | Group Dom. |
| 26 | A2620 | Rejected | | 6-27-52 | U.S. Corps of Engineers | (11) | | NENE | Dom. |
| 26 | A3388 | 3160 | Canc. | 9-30-53 | (b) (6) [redacted] | (40) | | NWNW | Irr. 4 Ac. |
| 26 | A4645 | 4369 | 3786A | 7-16-57 | Wing Point Water Service | 13 | 21 | SENE | Com. Dom. |
| 26 | A6314 | 6108 | | 5-21-62 | Town of Winslow | 100 | 161 | SWNE | Municipal Supply |
| 27 | A4779 | 4870 | 3689A | 2-20-58 | Weaver's Concrete Supplies | 10 | 16 | NWSE | Industrial |
| 27 | A4780 | 4520 | 3170A | 2-20-58 | Town of Winslow | 100 | 160 | NWSE | Municipal Supply |
| 27 | A4781 | 4521 | 3171A | 2-20-58 | Town of Winslow | 50 | 80 | NESW | Municipal Supply |
| 27 | A6199 | 5859 | | 3-5-62 | Northwest Berry Packers, Inc. | 200 | 157.6 | NESE | Dom. & Industrial |
| 30 | A4406 | 4146 | 3275A | 8-15-56 | Deseret Park & Water System, Inc. | 36 | 50 | SWSW | Com. Dom. |
| 32 | A6426 | Rejected | | 8-13-62 | South Bainbridge Water Co. | (67) | | Govt. Lot 4 | Municipal Supply |
| 34 | A3629 | 3436 | 2815A | 5-7-54 | U.S. Corps of Engineers | 5 | 8 | SESE | Dom. |
| | | | | | **T. 26 N., R. 1 W.W.M.** | | | | |
| 36 | A5660 | 5348 | 3822A | 7-11-60 | (b) (6) [redacted] | 10 | 7.6 | Govt. Lot 2 | Irr. 1 Ac. & Dom. |
| | | | | | **T. 26 N., R. 1 E.W.M.** | | | | |
| 5 | A6324 | 5956 | | 5-15-62 | (b) (6) [redacted] | 150 | 63 | NWSE | Com. Dom. |
| 13 | A3630 | 3348 | 1990A | 5-18-54 | [redacted] | 45 | 20 | NENW | Irr. 10 Ac. |
| 13 | A3780 | 3534 | 2728A | 10-8-54 | [redacted] | 50 | 16 | NENW | Irr. 8 Ac. & Dom. |
| 14 | A6031 | 5685 | | 8-21-61 | [redacted] | 280 | 59.6 | SWNE | Irr. 27 Ac. & Dom. |
| 15 | A3728 | 3527 | Canc. | 8-9-54 | [redacted] | (200) | | W½SE | Dom. |
| 15 | A3786 | 3556 | Canc. | 10-19-54 | [redacted] | (16) | | NWNE | Dom. & Commercial |
| 27 | A5678 | 5359 | 3849A | 7-26-60 | [redacted] | 25 | 8.6 | Govt. Lot 4 | Irr. 1.5 Ac. & Dom. |
| 30 | A6556 | | | 11-29-62 | Dept. of the Navy | 150 | 240 | NESW | Dom. & Fire Prot. |
| | | | | | **T. 26 N., R. 2 E.W.M.** | | | | |
| 10 | A 761 | 942 | 944A | 3-5-48 | (b) (6) [redacted] | 30 | 48 | SESE | Municipal Supply |
| 10 | A2125 | 1985 | 955A | 9-7-51 | [redacted] | 30 | 48 | SESE | Com. Dom. |
| 10 | A4192 | 3954 | Canc. | 1-5-55 | Indianola Water Service | (250) | | | Com. Dom. |
| 15 | A6259 | 5891 | 4340A | 4-17-62 | (b) (6) [redacted] | 60 | 96 | NENE | Com. Dom. |
| 16 | D 111 | | 62D | 8-1-39 | Suquamish Improvement Co. | 50 | 80 | NESW | Com. Dom. & Irr. |
| | Certificate of Change 557 | | | | Suquamish Improvement Co. | | | | |
| 16 | A 120 | 79 | 22A | 2-13-46 | Suquamish Improvement Co. | 50 | 80 | NESW | Com. Dom. & Irr. |

| Sec. | Appl. | Permit | Cert. | Priority | Name | Quantity GPM | Quantity Ac-Ft/Yr | Well Loc. | Use |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | T. 26 N., R. 2 E.W.M. (Continued) | | | | |
| 18 | A4850 | 4580 | 3387A | 5-5-58 | (b) (6) [redacted] | 100 | 68 | NWNW | Irr. 34 Ac. |
| 30 | A6184 | 5850 | | 2-19-62 | | 250 | 150 | W½SW | Irr. 75 Ac. |
| 33 | A3659 | 3412 | Canc. | 6-2-54 | Bloedel Timberlands Dev., Inc. | (40) | | NWNE | Irr. 35 Ac. & Dom. |
| 35 | D 207 | | 286D | 1930 | State Parks Committee | 5 | 7.6 | Govt. Lot 3 | Park Supply |
| 35 | A6208 | 5887 | | 3-9-62 | Monroe Point Water Co. | 25 | 22.5 | Govt. Lot 2 | Com. Dom. |
| | | | | | T. 26 N., R. 3 E.W.M. | | | | |
| 7 | D 20 | | 16D | 1929 | Puget Sound Power & Light | 5 | 8 | Govt. Lot 1 | Dom. & Fire Prot. |
| | | | | | T. 27 N., R. 1 E.W.M. | | | | |
| 14 | A5131 | 4833 | 4145A | 2-16-59 | Jensen, Richards, & Olhava | 47 | 75.2 | SESW | Group Dom. |
| 27 | A3485 | 3298 | 1875A | 1-20-54 | (b) (6) [redacted] | 200 | 75.9 | NWSE | Sand & Gravel Washing |
| 33 | A5536 | 5402 | | 3-24-60 | | 10 | 16 | Govt. Lot 4 | Com. Dom. |
| 33 | A5892 | 5585 | | 4-5-61 | | 20 | 5.6 | SW¼ | Irr. ½ Ac. & Dom. |
| | | | | | T. 27 N., R. 2 E.W.M. | | | | |
| 6 | A5292 | Rejected | | 6-18-59 | Pope & Talbot, Inc. | (150) | | SWSE | Dom. & Industrial |
| 7 | A4711 | 4409 | 3011A | 10-10-57 | Pope & Talbot, Inc. | 100 | 160 | NENE | Municipal Supply & Industrial |
| 23 | A 407 | 501 | Canc. | 12-5-46 | (b) (6) [redacted] | (30) | | W½E½ | Dom., Dairy & Irr. 5 Ac. |
| 25 | A3628 | 3435 | 2814A | 5-7-54 | U.S. Corps of Engineers | 5 | 8 | NW¼ | Dom. |
| 25 | A5839 | 5548 | 3995A | 2-20-61 | Kingston Water Users Corp. | 100 | 160 | W½NW | Municipal Supply |
| | | | | | T. 28 N., R. 1 E.W.M. | | | | |
| 12 | A5189 | 4873 | | 10-21-58 | (b) (6) [redacted] | 30 | 30.6 | Govt. Lot 4 | Group Dom. |
| | | | | | T. 28 N., R. 2 E.W.M. | | | | |
| 32 | A6463 | | | 9-6-62 | Cliffside Development Co. | 40 | 64 | Govt. Lot 3 | Com. Dom. |

## APPENDIX D

Appendix D lists all valid surface-water filings in the study area as of January 1, 1963. Cancelled permits and rejected applications are not listed since it is assumed no diversions are taking place under them.

All of the rights are tabulated by drainage basin and each drainage is listed by name in ascending order according to its stream number (p. ). The stream numbers follow each basin or drainage name in parentheses, however, no numbers were assigned to small springs and other poorly defined drainages.

The first three columns of the tabulation refer to the application, permit, and certificate numbers of a particular right. The absence of a number in a column indicates that an application has not yet progressed to permit status or has not been perfected to certificate.

The priority column indicates the date upon which the application was received; thus determining its priority relative to other rights which may affect or be affected by it.

The source column lists the specific body of water from which the diversion is made.

The next column, "Name," refers to the name of the applicant, permittee, or original holder of the certificate, and does not necessarily refer to the present holder of the right or owner of the land. Once a certificate of water right is issued, it becomes appurtenant to the land, and the Division of Water Resources does not retain records of changes of ownership.

The total quantity column lists the amount of water in cubic feet per second which may be diverted under a specific right. Storage capacity is shown in acre-feet.

The location of point of diversion column indicates the township, range, smallest recorded sub-division, and section in which the diversion point is situated.

The use and quantity column shows a breakdown of specific uses under each right, that portion of the total allowable diversion allocated to each use in cubic feet per second and, in the case of irrigation, the number of acres involved when known. In each case the quantity allowed for a specific use is listed in parentheses following the use. If the same quantity is used for both consumptive and non-consumptive uses, the consumptive uses are given preference and the remainder, if any, is assigned to the non-consumptive uses. Thus in every case, the sum of the quantities for all uses will equal the total quantity appropriated. No quantity breakdown is indicated when a right was issued for a single use, or where a total diversion of 0.01 cfs or less was involved for two or more consumptive uses, unless such a division was specified in the right. The following abbreviations are used in this column.

| | |
|---|---|
| Ac. ------------------- | Acres |
| Com. Dom. ------------- | Community Domestic |
| Group Dom. ------------- | Group Domestic |
| Fire Prot. ------------- | Fire Protection |
| Fish ------------------- | Fish Propagation |
| Ind. ------------------- | Industrial |
| Irr. ------------------- | Irrigation |
| Wild ------------------- | Wildlife |

The use of water under a permit or certificate is often restricted or controlled by various special provisions. These provisions, if any, are listed in the proviso column according to the following abbreviations:

S - - Screening-Diversion intake shall be tightly screened at all times with wire having a mesh opening not greater than 0.125 (1/8) inch.

D - - No Dam-No dam shall be constructed in connection with this diversion.

F - - Low Flow-All diversion shall cease when the flow of stream in question falls below a specified amount, either as measured directly below the point of diversion or other particular point.

A - - Supplemental (Additional) Right-The total annual diversion under the permit or certificate in question shall not exceed a specified volumetric amount less any amount diverted under previous rights appurtenant to the same system.

B - - Ponds Outside Stream Channel-No ponds are to be constructed in the normal stream channel.

L - - Fish Passage Facilities-A fish passage facility is to be incorporated in the structure as specified by the Departments of Fish and Game to allow passage of migratory fish.

O - - Outlet-An outlet is to be incorporated in the construction to permit a minimum flow to by-pass the system.

P - - Pollution-It should be noted that use of the waters appropriated under this application will be largely non-consumptive and all or a portion of the diverted quantity will be returned to this source of supply or other public waters. Under the State's Pollution Control Law, as amended by Chapter 71, Laws of 1955, any person who conducts a commercial or industrial operation of any type which results in the disposal of solid or liquid waste material into the waters of the state shall procure a permit from the Pollution Control Commission before disposing of such waste material. In view of this provision, the applicant is advised to contact the Pollution Control Commission, Olympia; with regard to the need for compliance with this portion of the act.

C - - Other Provisions-

APPENDIX D

SURFACE-WATER RIGHTS ON RECORD WITH THE DIVISION OF WATER RESOURCES

AS OF JANUARY 1, 1963

| App. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Unnamed Stream Tributary Lynch Cove (3) | | | | | | |
| 5546 | 3543 | 2117 | 8-5-41 | Unnamed stream | (b) (6) [redacted] | 0.01 | 23/1W | SWSW | 32 | Dom. | --- |
| 6385 | 4121 | 2279 | 4-18-45 | Unnamed stream | [redacted] | 0.03 | 23/1W | SWSE | 32 | Dom. & Garden Irr. | --- |
| 10400 | 7817 | 5112 | 6-5-51 | Unnamed stream | [redacted] | 0.02 | 23/1W | SESW | 32 | Dom. | S, D |
| | | | | | Sweetwater Creek Tributary Lynch Cove (4) | | | | | | |
| 4200 | 2355 | 1805 | 2-14-36 | Sweetwater Creek | Mason Co. School Dist. No. 45 | 0.13 | 23/1W | NWSE | 32 | Dom. (0.01) & Irr. 1 Ac. (0.02)., Fire Prot. (0.10) | --- |
| 5545 | 3542 | 2116 | 8-5-41 | Sweetwater Creek | (b) (6) [redacted] | 0.02 | 23/1W | NWSW | 32 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| 5562 | 3643 | 4830 | 8-22-41 | Sweetwater Creek | [redacted] | 0.25 | 23/1W | NESW | 32 | Fish propagation | --- |
| 6831 | 4505 | 2651 | 1-3-46 | Sweetwater Creek | Bearcat Water Corp. | 0.08 | 23/1W | NWSE | 32 | Com. Dom.& Fire Prot. | --- |
| Certificate of Change | | 408 | | | Bearcat Water Corp. | | | | | | |
| | | 473 | | | Bearcat Water Corp. | | | | | | |
| | | 563 | | | Bearcat Water Corp. | | | | | | |
| 14679 | 11016 | 7276 | 2-26-58 | Sweetwater Creek | (b) (6) [redacted] | 0.50 | 23/1W | NWSW | 32 | Duck ponds (0.43) & Irr. 7 Ac. (0.07) | S |
| | | | | | Unnamed Tributary of Union River Estuary (6) | | | | | | |
| 10857 | 7979 | 5167 | 11-2-51 | Unnamed spring | Belfair Water Company | 0.05 | 23/1W | NENE | 32 | Com. Dom. | --- |
| 13589 | 10228 | 6789 | 9-9-55 | Unnamed spring | (b) (6) [redacted] | 0.01 | 23/1W | NWNE | 32 | Dom. | --- |
| 5015 | 3479 | 1840* | 11-7-39 | Unnamed stream | [redacted] | 0.05 | 23/1W | SESE | 29 | Com. Dom. | --- |
| | | | | | Union River Drainage (7) | | | | | | |
| | | | | | Union River Tributary Lynch Cove | | | | | | |
| 2599 | 2235 | 2509 | 5-22-29 | West Fork of Union River | City of Bremerton | 10.00 | 24/1W | SWNE | 34 | Municipal supply | --- |
| R4178 | R144 | 2793 | 11-25-35 | Union River | City of Bremerton | 1200 a.f. | 24/1W | SESE | 35 | Municipal supply | --- |
| 5230 | 3539 | 2626 | 8-13-40 | Union River | (b) (6) [redacted] | 1.02 | 23/1W | SWNW | 16 | Dom. (0.01), operation of current wheel (1.00) & Irr. 2 Ac. (0.01) | --- |
| 5270 | 3162 | 1836 | 9-27-40 | Union River | (b) (6) [redacted] | 0.01 | 23/1W | Govt. Lot 2 | 3 | Dom. & Garden Irr. 2 Ac. | --- |
| 9647 | 7141 | 3999 | 6-1-50 | Union River | [redacted] | 0.01 | 23/1W | SWNW | 16 | Dom. | S |
| Certificate of Change | | 562 | | | [redacted] | | | | | | |
| 9786 | 7198 | 5745 | 7-24-50 | Union River | [redacted] | 0.01 | 23/1W | NWSE | 20 | Irr. 1 Ac. | S |
| 13552 | 10752 | 6945 | 8-12-55 | Union River | City of Bremerton | 25.00 | 24/1W | SWNE | 34 | Municipal supply | F |
| R13553 | R210 | 6945 | 8-12-55 | Union River | City of Bremerton | 4000 a.f. | 24/1W | SW<br>SE | 26<br>27 | Municipal supply | --- |
| 14038 | 10672 | 7295 | 8-21-56 | Union River & unnamed spring | (b) (6) [redacted] | 0.17 | 23/1W | SESW & SWSE | 20 | Dom. (0.01) & Irr. 17 Ac. (0.16) | S, D, F |
| 14517 | 10995 | | 9-24-57 | Union River | (b) (6) [redacted] | 0.06 | 23/1W | NWSE | 20 | Dom. (0.01) & Irr. 6 Ac. (0.05) | S, F |
| 16896 | 12524 | | 9-12-61 | Union River | [redacted] | 0.025 | 23/1W | NENW | 16 | Dom. (0.01) & Irr. 1½ Ac. (0.015) | S, D, F |
| | | | | | Unnamed Stream Tributary Union River | | | | | | |
| 1763 | 1211 | 1311 | 6-24-26 | Unnamed stream | (b) (6) [redacted] | 0.02 | 23/1W | NESE | 29 | Dom. (0.01) & Irr. (0.01) | --- |
| 5015 | 3479 | 1840 | 11-7-39 | Unnamed stream | North Belfair Community Water Co. | 0.25 | 23/1W | SWSW | 28 | Com. Dom. | --- |
| Certificate of Change | | 692 | | | North Belfair Community Water Co. | | | | | | |

*Certificate in error, change required.

## KITSAP PENINSULA

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Unnamed Stream Tributary Union River - Continued** | | | | | | |
| 5704 | 3593 | 2347 | 5-28-42 | Unnamed stream | [redacted] | 0.10 | 23/1W | NWSW | 28 | Group Dom. | --- |
| Certificate of Change 611 | | | | | | | | | | | |
| 7635 | 5081 | 3402 | 2-13-47 | Unnamed stream | North Belfair Community Water Co. | 0.15 | 23/1W | SWSW | 28 | Com. Dom. | --- |
| Certificate of Change 691 | | | | | North Belfair Community Water Co. | | | | | | |
| | | | | | **Unnamed Brook Tributary Union River** | | | | | | |
| 1515 | 674 | 2021 | 10-14-25 | Unnamed brook | [redacted] | 0.03 | 23/1W | SWNE | 29 | Dom. (0.01) & Irr. 2 Ac. (0.02) | --- |
| 4250 | 2311 | 5378 | 7-11-36 | Unnamed brook | | 0.10 | 23/1W | SWSW | 21 | Fish pond & Irr. 10 Ac. | --- |
| 4251 | 2312 | 1085 | 7-13-36 | Unnamed spring | | 0.05 | 23/1W | NWSW | 21 | Dom. (0.01) & Irr. 3 Ac. (0.04) | --- |
| 5796 | 3684 | 2443 | 2-26-42 | Unnamed brooklet | | 0.02 | 23/1W | NESW | 21 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| 12417 | 9224 | 5974 | 6-18-53 | Unnamed brooklet | | 0.01 | 23/1W | NWSW | 21 | Dom. | S, D |
| 12418 | 9225 | 5975 | 6-18-53 | Unnamed brooklet | | 0.01 | 23/1W | NWSW | 21 | Dom. | S, D |
| | | | | | **Unnamed Stream Tributary Union River** | | | | | | |
| 4778 | 2740 | 1792 | 4-11-39 | Unnamed stream | [redacted] | 0.15 | 23/1W | SESW | 20 | Irr. 15 Ac. | --- |
| 9783 | 7197 | 4082 | 7-21-50 | Unnamed stream | | 0.01 | 23/1W | NESW | 20 | Dom. | S |
| 11018 | 8022 | 5570 | 2-4-52 | Unnamed lake | | 0.18 | 23/1W | NESW | 20 | Irr. 18 Ac. | --- |
| 15363 | 11356 | 7562 | 3-27-59 | Unnamed stream | | 0.01 | 23/1W | SW | 20 | Dom. | S |
| | | | | | **Unnamed Brooklet Tributary Union River** | | | | | | |
| 11730 | 8511 | 5236 | 10-2-52 | Unnamed spring | [redacted] | 0.10 | 23/1W | SWNW | 21 | Irr. 15 Ac. | --- |
| | | | | | **Unnamed Stream Tributary Union River** | | | | | | |
| 12896 | 9786 | | 5-4-54 | Unnamed spring & stream | [redacted] | 0.09 | 23/1W | N$\frac{1}{2}$NW | 20 | Stock, Dom. (0.01) & Irr. 8 Ac. (0.08) | --- |
| 13069 | 9791 | 6886 | 8-9-54 | Unnamed stream | | 0.03 | 23/1W | NENW | 20 | Dom. (0.01) & Irr. 2 Ac. (0.02) | --- |
| | | | | | **Unnamed Drainage Ditch Tributary Union River** | | | | | | |
| 12380 | 9138 | 5954 | 6-1-53 | Drainage ditch | [redacted] | 0.40 | 23/1W | NENE | 20 | Irr. 40 Ac. | S, D |
| | | | | | **Courtney Creek Tributary Union River** | | | | | | |
| 4310 | 2371 | 1863 | 11-4-36 | Unnamed spring | [redacted] et al | 0.03 | 23/1W | SESW | 17 | Dom. | --- |
| 17536 | 12889 | | 9-21-62 | Courtney Creek | | 0.01 | 23/1W | NWNE | 20 | Dom. | S, D |
| | | | | | **Unnamed Stream Tributary Union River** | | | | | | |
| 6128 | 3992 | 3086 | 8-26-44 | Unnamed stream | [redacted] | 0.01 | 23/1W | NESE | 17 | Dom. | --- |
| | | | | | **Unnamed Creek Tributary Union River** | | | | | | |
| 9482 | 7155 | | 3-24-50 | Unnamed spring | [redacted] | 0.01 | 23/1W | SENE | 17 | Dom. | --- |
| 9624 | 7089 | 4333 | 5-22-50 | Unnamed creek | | 0.01 | 23/1W | SENE | 17 | Dom. | S |

Unnamed Stream Tributary Union River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2199 | 1118 | 513 | 11-15-27 | Unnamed stream | (b) (6) [redacted] | 0.32 | 23/1W | NWNW | 16 | Dom. (0.01) & Irr. 23 Ac. (0.31) | --- |
| 7004 | 4889 | 2829 | 3-27-46 | Unnamed stream | | 0.01 | 23/1W | NWNW | 16 | Dom. | --- |

Unnamed Brook Tributary Union River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5022 | 2950 | 1868 | 11-14-39 | Unnamed brook | (b) (6) [redacted] | 0.03 | 23/1W | SESW | 9 | Dom. (0.01)& Irr. 3 Ac., lawn & garden (0.02) | L |
| 6381 | 4138 | 3065 | 4-11-45 | Unnamed brook | | 0.005 | 23/1W | SESW | 9 | Dom. | --- |
| 7897 | 5269 | 4455 | 6-20-47 | Unnamed brook | | 0.02 | 23/1W | SESW | 9 | Dom. (0.01) & Irr. 2 Ac. (0.01) | S |
| 17348 | | | 6-18-62 | Unnamed spring | | 0.01 | 23/1W | SWSW | 9 | Dom. | --- |

Bear Creek Tributary Union River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2974 | 1580 | 717 | 5-5-30 | Bear Creek | (b) (6) [redacted] | 0.03 | 23/1W | SESE | 9 | Dom. | --- |
| 4186 | 2270 | 1133 | 12-31-35 | Bear Creek | | 1.11 | 23/1W | SESE | 9 | Trout pond, hatchery (1.10) & Dom. (0.01) | --- |
| 4431 | 3085 | 3056 | 6-24-37 | Bear Creek | | 0.02 | 23/1W | SESE | 9 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| 6000 | 3869 | 2708 | 4-13-44 | Bear Creek | | 0.02 | 23/1W | NWSE | 9 | Dom. (0.01) & Irr. 1½ Ac. (0.01) | --- |
| 6462 | 4327 | 2438 | 5-31-45 | Bear Creek | | 0.005 | 23/1W | NWSE | 9 | Dom. | S |
| 6463 | 4198 | 2331 | 5-31-45 | Bear Creek | | 0.005 | 23/1W | NWSE | 9 | Dom. | S |
| 6464 | 4334 | 3323 | 5-31-45 | Bear Creek | | 0.005 | 23/1W | NWSE | 9 | Dom. | S |
| 6465 | 4199 | 2317 | 5-31-45 | Bear Creek | | 0.01 | 23/1W | NWSE | 9 | Dom. | S |
| 6466 | 4335 | 3585 | 5-31-45 | Bear Creek | | 0.005 | 23/1W | NWSE | 9 | Dom. | S |
| 6467 | 4194 | 2436 | 5-31-45 | Bear Creek | | 0.01 | 23/1W | SWSE | 9 | Dom. | S |
| 6468 | 4186 | 2322 | 5-31-45 | Bear Creek | | 0.005 | 23/1W | SWSE | 9 | Dom. | S |
| 6469 | 4153 | 2292 | 5-31-45 | Bear Creek | | 0.005 | 23/1W | NWSE | 9 | Dom. | S |

Unnamed Stream Tributary Union River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5506 | 3401 | 1747 | 7-12-41 | Unnamed stream | (b) (6) [redacted] | 0.01 | 23/1W | NWSW | 11 | Dom. & Stock | --- |
| 5695 | 3670 | 1957 | 5-6-42 | Unnamed stream | U.S. Army Engineers | 0.20 | 23/1W | NWSW | 11 | Dom. (0.01) & Airfield Use (0.19) | --- |

Unnamed Brooklet Tributary Union River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5954 | 3841 | 2406 | 2-2-44 | Unnamed brooklet | (b) (6) [redacted] | 0.01 | 23/1W | NENE | 9 | Dom. | --- |
| 6033 | 4260 | 2481 | 5-22-44 | Unnamed brooklet | | 0.01 | 23/1W | NENE | 9 | Dom. | --- |

Unnamed Spring Tributary Union River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8757 | 6447 | 3616 | 4-15-49 | Unnamed spring | (b) (6) [redacted] | 0.01 | 23/1W | SESE | 4 | Dom. | --- |

East Fork Union River Tributary Union River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10111 | 7314 | 5722 | 2-6-51 | Unnamed spring | (b) (6) [redacted] | 0.15 | 23/1W | SENE | 3 | Irr. 15 Ac. | S |

Unnamed Stream Tributary Union River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8451 | 5740 | 3856 | 6-4-48 | Unnamed stream | (b) (6) [redacted] | 0.04 | 23/1W | NWSW | 3 | Dom. (0.01) & Irr. 4 Ac. (0.03) | S |
| 10226 | 7940 | 5613 | 4-5-51 | Unnamed drainage ditch | | 0.10 | 23/1W | SWNW | 3 | Irr. 12 Ac. | S |

Lesco Creek Tributary Union River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2598 | 2234 | 2222 | 5-22-29 | East Fork Union River* | City of Bremerton | 5.00 | 24/1W | NWSW | 35 | Municipal supply | --- |
| 5013 | 3080 | 1556 | 11-7-39 | Unnamed stream | (b) (6) [redacted] | 0.01 | 24/1W | NWSW | 35 | Dom. | --- |
| 5045 | 3110 | 1450 | 12-26-39 | Unnamed stream | | 0.025 | 24/1W | NESW | 35 | Group Dom. | --- |
| 9554 | 7156 | 4633 | 4-24-50 | Unnamed stream | | 0.01 | 24/1W | SENW | 35 | Dom. | S |
| 13129 | 9781 | 6398 | 9-16-54 | Unnamed stream | | 0.005 | 24/1W | NESW | 35 | Dom. | S, D |

*Certificate in error, change required.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **KITSAP PENINSULA** | | | | | | |
| | | | | | **Hazel Creek Tributary Union River** | | | | | | |
| 16566 | 12369 | | 3-8-61 | Hazel Creek | [redacted] | 0.10 | 23/1W | Govt. Lot 4 | 3 | Dom. (0.02) & Beautification (0.08) | S, L |
| 9888 | 7367 | 5758 | 9-11-50 | Unnamed swamp | | 0.22 | 23/1W | SENW | 3 | Irr. 22 Ac. | --- |
| | | | | | **Unnamed Drainages Tributary Lynch Cove (10 & 11)** | | | | | | |
| 13958 | 10542 | 7178 | 7-2-56 | Unnamed spring & pond | Belfair Sand and Gravel | 0.60 | 23/1W | SWSE | 30 | Dom. (0.01) & Gravel Washing (0.59) | --- |
| | | | | | **Mission Creek Drainage Tributary Hood Canal (12)** | | | | | | |
| 9718 | | | 6-23-50 | Mission Creek | City of Bremerton | 5.00 | 24/1W | NW | 32 | Municipal supply | --- |
| 9875 | 7815 | | 9-7-50 | Mission Creek | [redacted] | 0.51 | 23/2W | NESW | 36 | Dom. (0.01) & Fish Ponds (0.50) | S, D, F, B |
| 13584 | 10235 | | 9-2-55 | Unnamed springs | | 0.01 | 23/2W | NESW | 36 | Dom. | --- |
| 16770 | 12439 | 8572 | 7-10-61 | Unnamed spring | | 0.01 | 23/1W | NWSW | 30 | Dom. | S |
| | | | | | **Little Mission Creek Tributary Hood Canal (13)** | | | | | | |
| 1704 | 705 | 158 | 5-5-26 | Little Mission Creek | [redacted] | 0.20 | 23/2W | SESE | 35 | Dom. (0.01), Fish Pond (0.09) & Irr. 10 Ac. (0.10) | --- |
| 1704 | 705 | 159 | 5-5-26 | Little Mission Creek | | 0.20 | 23/2W | SESE | 35 | Dom. (0.01) & Irr. 10 Ac. (0.19) | --- |
| 6178 | 3971 | | 9-28-44 | Little Mission Creek | | 0.02 | 23/2W | SESE | 35 | Dom. (0.01) & Irr. 2 Ac. (0.01) | S |
| 8752 | 5998 | 3393 | 4-11-49 | Unnamed spring | | 0.02 | 23/2W | SESW | 36 | Dom. | F |
| 11028 | 8108 | 6527 | 2-6-52 | Unnamed spring | | 0.02 | 23/2W | SESW | 36 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| 13684 | 10231 | 6816 | 12-16-55 | Unnamed spring | | 0.02 | 23/2W | SESW | 36 | Dom. | S |
| | | | | | **Unnamed Springs Tributary Hood Canal** | | | | | | |
| 15521 | 11505 | 7649 | 6-15-59 | Unnamed springs | [redacted] | 0.01 | 22/2W | Govt. Lot 2 | 2 | Dom. | S |
| | | | | | **Unnamed Stream Tributary Hood Canal (14)** | | | | | | |
| 4442 | 2503 | 1507 | 7-28-37 | Unnamed stream | [redacted] | 0.01 | 22/2W | Govt. Lot 2 | 2 | Dom. | --- |
| | | | | | **Johnson Creek Tributary Hood Canal (15)** | | | | | | |
| 4641 | 2634 | 1163 | 9-30-38 | Johnson Creek | Johnson Creek Water Users Association | 0.10 | 22/2W | Govt. Lot 2 | 2 | Com. Dom. | S |
| 7027 | 4747 | 2684 | 4-4-46 | Johnson Creek | [redacted] et al | 0.02 | 22/2W | SENW | 2 | Dom. | S |
| | | | | | **Unnamed Spring Tributary Hood Canal** | | | | | | |
| 16194 | 11931 | 8086 | 7-21-60 | Unnamed spring | [redacted] | 0.01 | 22/2W | Govt. Lot 3 | 2 | Dom. | S |
| | | | | | **Unnamed Stream Tributary Hood Canal (16)** | | | | | | |
| 3765 | 1976 | 665 | 12-10-32 | Unnamed stream | [redacted] | 0.01 | 22/2W | Govt. Lot 3 | 2 | Dom. & Irr. 1 Ac. | --- |
| 3780 | 2062 | 754 | 1-30-33 | Unnamed stream | | 0.01 | 22/2W | Govt. Lot 3 | 2 | Dom. & Irr. 1 Ac. | --- |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Unnamed Stream Tributary Hood Canal (17)** | | | | | | |
| 7146 | 4657 | 3168 | 5-20-46 | Unnamed stream | [redacted] | 0.005 | 22/2W | Govt. Lot 4 | 2 | Dom. | --- |
| 14896 | 11175 | 7484 | 7-3-58 | Unnamed stream | | 0.005 | 22/2W | Govt. Lot 4 | 2 | Dom. | --- |
| 15073 | 11168 | 8035 | 9-10-58 | Unnamed spring | | 0.005 | 22/2W | Govt. Lot 4 | 2 | Dom. | --- |
| | | | | | **Stimson Creek Tributary Hood Canal (18)** | | | | | | |
| 6392 | 4215 | 3618 | 4-23-45 | Unnamed spring | Pleasant Cove Water Association | 0.25 | 22/2W | SWSE | 3 | Com. Dom. | S, L |
| Certificate of Change 432 | | | | | Pleasant Cove Water Association | | | | | | |
| | | | | | **Unnamed Springs Tributary Hood Canal (19 & 20)** | | | | | | |
| 16861 | 12503 | | 8-23-61 | Unnamed springs | Broadview Beach Tracts | 0.50 | 22/2W | Govt. Lot 4 | 10 | Com. Dom. | --- |
| | | | | | **Unnamed Stream Tributary Hood Canal (21)** | | | | | | |
| 11781 | 8704 | 5677 | 10-22-52 | Unnamed stream | [redacted] | 0.03 | 22/2W | SENE | 9 | Dom. | --- |
| | | | | | **Unnamed Stream Tributary Hood Canal (23)** | | | | | | |
| 11484 | 8339 | 4940 | 6-26-52 | Unnamed stream | [redacted] | 0.01 | 22/2W | NWSE | 9 | Irr. 1 Ac. | S, D |
| | | | | | **Unnamed Spring Tributary Hood Canal** | | | | | | |
| 5614 | 3487 | 2611 | 11-17-41 | Unnamed spring | Clifton Beach Tracts Coop. Water Association | 0.05 | 22.2W | NWSE | 9 | Group Dom. | --- |
| | | | | | **Unnamed Stream Tributary Hood Canal (24)** | | | | | | |
| 5322 | 3288 | 2622 | 12-24-40 | Unnamed stream | Clifton Beach Tracts Coop. Water Association | 0.02 | 22/2W | NESW | 9 | Group Dom. | --- |
| 5440 | 3454 | 1794 | 5-1-41 | Unnamed stream | [redacted] et al | 0.02 | 22/2W | NESW | 9 | Dom. | --- |
| | | | | | **Unnamed Spring Tributary Hood Canal (26)** | | | | | | |
| 6094 | 3894 | 2488 | 8-4-44 | Unnamed spring | [redacted] | 0.02 | 22/2W | Govt. Lot 1 | 17 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| | | | | | **Unnamed Stream Tributary Hood Canal (27)** | | | | | | |
| 6388 | 4125 | 2489 | 4-19-45 | Unnamed stream | [redacted] | 0.01 | 22/2W | Govt. Lot 1 | 17 | Dom. & Irr 2 Ac. | --- |
| | | | | | **Unnamed Stream Tributary Hood Canal (28)** | | | | | | |
| 5445 | 3348 | 2169 | 5-3-41 | Unnamed stream | [redacted] | 0.01 | 22/2W | Govt. Lot 1 | 17 | Dom. | --- |
| 5528 | 3430 | 1956 | 7-25-41 | Unnamed springs | | 0.005 | 22/2W | Govt. Lot 2 | 17 | Dom. | --- |
| 5539 | 3395 | 2169 | 8-4-41 | Unnamed stream | | 0.01 | 22/2W | Govt. Lot 1 | 17 | Dom. | --- |
| 13287 | 9916 | 6181 | 2-14-55 | Unnamed spring | | 0.01 | 22/2W | Govt. Lot 2 | 17 | Dom. | --- |
| | | | | | **Unnamed Spring Tributary Hood Canal** | | | | | | |
| 6095 | 3906 | 2627 | 8-4-44 | Unnamed spring | [redacted] | 0.01 | 22/2W | Govt. Lot 2 | 17 | Dom. & Garden Irr. | --- |
| | | | | | **Unnamed Stream Drainage Tributary Hood Canal (29)** | | | | | | |
| 15939 | 11901 | 8303 | 3-9-60 | Unnamed spring | [redacted] et al | 0.003 | 22/2W | Govt. Lot 2 | 17 | Dom. | S |

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Unnamed Stream Tributary Hood Canal (32) | | | | | | |
| 4491 | 2533 | 1304 | 1-17-38 | Unnamed stream | [redacted] | 0.02 | 22/2W | Govt. Lot 4 | 17 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Hood Canal (33) | | | | | | |
| 14743 | 11172 | 7438 | 4-8-58 | Unnamed stream | [redacted] | 0.02 | 22/2W | Govt. Lot 2 | 18 | Dom. | --- |
| | | | | | Anderson Creek Tributary Hood Canal (35) | | | | | | |
| 6905 | 4554 | 2562 | 2-16-46 | Anderson Creek | [redacted] | 0.02 | 22/3W | SESE | 13 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| | | | | | Unnamed Stream Tributary Hood Canal (37) | | | | | | |
| 8510 | 5987 | 3710 | 7-9-48 | Two unnamed springs | [redacted] | 0.02 | 22/3W | Govt. Lot 2 | 24 | Dom. | S |
| | | | | | Unnamed Springs Tributary Hood Canal (38) | | | | | | |
| 16110 | 11927 | 8585 | 6-7-60 | Unnamed springs | Erickson Construction Corp. | 0.50 | 22/3W | Govt. Lot 3 | 24 | Com. Dom. | S |
| | | | | | Unnamed Spring Tributary Hood Canal | | | | | | |
| *4224 | 2289 | 1131 | 5-8-36 | Unnamed spring | [redacted] | 0.01 | 22/3W | Govt. Lot 4 | 24 | Dom. | --- |
| | | | | | Unnamed Spring Tributary Hood Canal | | | | | | |
| 14929 | 11314 | 7513 | 7-17-58 | Unnamed spring | [redacted] | 0.01 | 22/3W | Govt. Lot 4 | 24 | Dom. | S |
| | | | | | Unnamed Spring Tributary Hood Canal | | | | | | |
| 17616 | | | 11-15-62 | Unnamed spring | [redacted] | 0.01 | 22/3W | Govt. Lot 1 | 23 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Hood Canal (40) | | | | | | |
| 3747 | 1991 | 1491 | 11-14-32 | Unnamed stream | [redacted] | 0.05 | 22/3W | Govt. Lot 1 | 26 | Com. Dom. | --- |
| | | | | | Unnamed Spring Tributary Hood Canal (42) | | | | | | |
| 16825 | 12498 | 8357 | 8-2-61 | Unnamed spring | [redacted] | 0.01 | 22/3W | Govt. Lot 2 | 26 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Hood Canal (43) | | | | | | |
| 14086 | 10525 | 7553 | 9-19-56 | Unnamed stream | [redacted] | 0.01 | 22/3W | Govt. Lot 3 | 26 | Dom. | --- |
| | | | | | Unnamed Spring Tributary Hood Canal | | | | | | |
| 14898 | 12038 | 7460 | 7-7-58 | Unnamed spring | [redacted] et al | 0.01 | 22/3W | Govt. Lot 2 | 27 | Dom. | --- |

Unnamed Spring Tributary Hood Canal

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11831 | 8685 | 5144 | 11-14-52 | Unnamed spring | (b) (6) | 0.01 | 22/3W | Govt. Lot 2 | 27 | Dom. | --- |
| 14477 | 10960 | 7508 | 9-3-57 | Unnamed spring | | 0.0033 | 22/3W | Govt. Lot 2 | 27 | Dom. | S |
| 14477 | 10960 | 7521 | 9-3-57 | Unnamed spring | | 0.0033 | 22/3W | Govt. Lot 2 | 27 | Dom. | S |
| 14477 | 10960 | 7556 | 9-3-57 | Unnamed spring | | 0.0033 | 22/3W | Govt. Lot 2 | 27 | Dom. | S |

Lake Tahuya (Wheeler's Lake) Tributary Tahuya Estuary

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1115 | 429 | 128 | 6-26-24 | Lake Tahuya (Wheeler's Lake) | (b) (6) | 0.25 | 22/3W | SENE | 27 | Dom. (0.02) & Irr. 7 Ac. (0.23) | --- |

Tahuya River Drainage (44)

Tahuya River Tributary Hood Canal

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9717 | | | 6-23-50 | Tahuya River | City of Bremerton | 20.00 | 24/1W | NWSW | 20 | Municipal supply | --- |
| 11886 | 8897 | 6178 | 12-9-52 | Tahuya River | (b) (6) | 0.40 | 22/2W | SWNE & SENW | 5 | Irr. 40 Ac. | S, D |
| R16593 | R254 | | 3-23-61 | Tahuya River | | 3000 a.f. | 24/1W | SENW | 20 | Recreation | L |

Unnamed Brook Tributary Tahuya River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16523 | 12289 | 8425 | 2-10-61 | Unnamed springs | (b) (6) | 0.01 | 22/3W | SWSE | 14 | Dom. | S |

Unnamed Stream Tributary Tahuya River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11212 | 8452 | 6194 | 4-3-52 | Unnamed stream | (b) (6) | 0.07 | 22/3W | SENE | 14 | Dom. (0.01) & Irr. 6 Ac. (0.06) | --- |

Lake Wooten Tributary Tahuya River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15382 | 11381 | 7853 | 4-7-59 | Wooten Lake | (b) (6) | 0.01 | 23/2W | $E\frac{1}{2}SW$ | 19 | Fire Prot. & Irr. 1 Ac. | S |
| 15573 | 11650 | 7741 | 7-14-59 | Wooten Lake | | 0.01 | 23/2W | $W\frac{1}{2}SE$ | 19 | Dom. & Fire Prot. | S |

Gold Creek Tributary Tahuya River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15876 | | | 1-28-60 | Gold Creek | Kitsap County P.U.D. No. 1 | 10.00 | 24/1W | $N\frac{1}{2}S\frac{1}{2}$ | 21 | Municipal supply | --- |
| R15877 | | | 1-28-60 | Gold Creek | Kitsap County P.U.D. No. 1 | 1000 a.f. | 24/1W | $S\frac{1}{2}$ | 21 | Municipal supply | --- |

Tin Mine Lake Tributary Tahuya River

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15111 | 11170 | | 9-24-58 | Tin Mine Lake | Scout Lake Mines, Inc. | 1.70 | 24/1W | NESE | 9 | Dom. (0.01) & Mining (1.69) | S |

Caldervin Creek Tributary Hood Canal (46)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8300 | 5688 | 7052 | 3-29-48 | Unnamed stream | (b) (6) | 0.34 | 22/3W | Govt. Lot 6 | 27 | Com. Dom (0.29) & Irr. 5 Ac. (0.05) | S |

Unnamed Stream Tributary Hood Canal (47)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11701 | 8766 | 8322 | 9-24-52 | Unnamed stream | (b) et al | 0.005 | 22/3W | Govt. Lot 2 | 28 | Dom. | --- |
| 11780 | 8608 | 5356 | 10-22-52 | Unnamed stream | (b) (6) | 0.015 | 22/3W | Govt. Lot 1 | 28 | Com. Dom. | --- |

Unnamed Stream Tributary Hood Canal (48)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2832 | 2003 | 686 | 1-23-30 | Unnamed stream | (b) (6) | 0.20 | 22/3W | Govt. Lot 3 | 28 | Dom. supply for camps (0.15) & Irr. 5 Ac. (0.05) | --- |

*Certificate in error, change required.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **KITSAP PENINSULA** | | | | | | |
| | | | | | **Unnamed Spring Tributary Hood Canal (49)** | | | | | | |
| 8503 | 6485 | | 7-7-48 | Unnamed spring, Hall & Haddy Creeks* | Great Bend Waterfront Tracts, Inc. | 0.16 | 22/3W | Govt. Lot 4 SWSW | 28 21 | Group Dom. | S, D, F |
| | | | | | **Hall Creek Tributary Hood Canal (50)** | | | | | | |
| 8503 | 6485 | | 7-7-48 | Unnamed spring, Hall & Haddy Creeks* | Great Bend Waterfront Tracts, Inc. | 0.16 | 22/3W | Govt. Lot 4 SWSW | 28 21 | Group Dom. | S, D, F |
| 17498 | | | 8-30-62 | Hall Creek & 2 unnamed springs | (b) (6) | 0.05 | 22/3W | SWSW | 21 | Group Dom. | --- |
| | | | | | **Haddy Creek Tributary Hood Canal (52)** | | | | | | |
| 8503 | 6485 | | 7-7-48 | Unnamed spring, Hall & Haddy Creeks* | Great Bend Waterfront Tracts, Inc. | 0.16 | 22/3W | Govt. Lot 4 SWSW | 28 21 | Group Dom. | S, D, F |
| 10451 | 7600 | 4503 | 6-29-51 | Unnamed spring | (b) (6) | 0.01 | 22/3W | SWSW | 21 | Dom. | S |
| | | | | | **Unnamed Stream Tributary Hood Canal (53)** | | | | | | |
| 8301 | 5689 | 6770 | 3-29-48 | Unnamed springs | (b) (6) | 0.15 | 22/3W | Govt. Lot 1 | 20 | Group Dom. | S |
| | | | | | **Unnamed Springs Tributary Hood Canal** | | | | | | |
| 17457 | 12879 | | 8-14-62 | Unnamed spring | (b) (6) | 0.02 | 22/3W | Govt. Lot 2 | 20 | Dom. | --- |
| 17500 | 12872 | 8652 | 9-5-62 | Unnamed spring | | 0.01 | 22/3W | SWSE | 20 | Dom. | S |
| | | | | | **Fay Creek Tributary Hood Canal (54)** | | | | | | |
| 8504 | 6486 | | 7-7-48 | Fay Creek & 5 unnamed springs | Great Bend Waterfront Tracts, Inc. | 0.07 | 22/3W | Govt. Lot 2 | 20 | Group Dom. | --- |
| 17422 | 12926 | | 7-27-62 | Unnamed spring | (b) (6) | 0.01 | 22/3W | Govt. Lot 2 | 20 | Dom. | S |
| 17456 | 12870 | 8651 | 8-14-62 | Unnamed spring | | 0.01 | 22/3W | Govt. Lot 2 | 20 | Dom. | S |
| 17499 | | | 8-30-62 | Fay Creek & unnamed springs | | 0.01 | 22/3W | SWSE | 20 | Dom. | --- |
| | | | | | **Unnamed Spring Tributary Hood Canal** | | | | | | |
| 17527 | 12875 | 8663 | 9-20-62 | Unnamed spring | (b) (6) | 0.01 | 22/3W | SESW | 20 | Dom. | S. |
| | | | | | **Unnamed Spring Tributary Hood Canal** | | | | | | |
| 17455 | 12921 | | 8-14-62 | Unnamed spring | (b) (6) | 0.01 | 22/3W | SESW | 20 | Dom. | S. |
| | | | | | **Brown's Creek Tributary Hood Canal (55)** | | | | | | |
| 8505 | 6487 | | 7-7-48 | Brown's Creek | Great Bend Waterfront Tracts, Inc. | 0.10 | 22/3W | SESW | 20 | Group Dom. | D, F |
| | | | | | **Unnamed Spring Tributary Hood Canal** | | | | | | |
| 17310 | 12923 | | 5-25-62 | Unnamed spring | (b) (6) | 0.005 | 22/3W | SWSW | 20 | Dom. | S |
| 17459 | 12853 | 8643 | 8-16-62 | Unnamed spring | | 0.01 | 22/3W | SWSW | 20 | Dom. | S |
| 17658 | | | 12-19-62 | Unnamed spring | | 0.005 | 22/3W | SWSW | 20 | Dom. | --- |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Unnamed Spring Tributary Hood Canal** | | | | | | |
| 17423 | 12848 | | 7-30-62 | Unnamed spring | (b) (6) [redacted] | 0.01 | 22/3W | NWNW | 29 | Dom. | S |
| | | | | | **West Creek Tributary Hood Canal (57)** | | | | | | |
| 8506 | 6488 | | 7-7-48 | West Creek | Great Bend Waterfront Tracts, Inc. | 0.03 | 22/3W | SWSW | 20 | Group Dom. | --- |
| | | | | | **Nancy Creek Tributary Hood Canal (58)** | | | | | | |
| 10426 | 7756 | 4545 | 6-18-51 | Nancy Creek | (b) (6) [redacted] | 0.01 | 22/3W | SWSE | 19 | Dom. | S |
| | | | | | **Unnamed Stream Tributary Hood Canal (61)** | | | | | | |
| 4148 | 2287 | 1206 | 9-7-35 | Unnamed stream | (b) (6) [redacted] | 0.01 | 22/3W | Govt. Lot 4 | 18 | Dom. | --- |
| | | | | | **Ralph Creek Tributary Hood Canal (62)** | | | | | | |
| 4438 | 2955 | 8561 | 7-17-37 | Ralph (Cougar) Creek | (b) (6) [redacted] | 0.05 | 22/3W | Govt. Lot 2 | 7 | Dom. (0.01) & Irr. 5 Ac. (0.04) | --- |
| | | | | | **Bonnie Creek Tributary Hood Canal (63)** | | | | | | |
| 4439 | 2956 | | 7-17-37 | Bonnie Creek | (b) (6) [redacted] | 0.05 | 22/3W | Govt. Lot 3 | 7 | Dom. (0.01) & Irr. 5 Ac. (0.04) | --- |
| | | | | | **Unnamed Stream Tributary Hood Canal (64)** | | | | | | |
| 3042 | 2051 | 724 | 7-11-30 | Unnamed stream | (b) (6) [redacted] | 0.05 | 22/3W | NWNW | 8 | Dom. & Irr. lawn & garden | --- |
| 14657 | 11050 | 8405 | 2-6-58 | Robbins Lake & unnamed springs | Mt. Rainier Council Boy Scouts of America | 0.20 | 22/3W<br>22/3W | SENE<br>NWNW | 5<br>8 | Camp, Dom. | S |
| | | | | | **Unnamed Stream Tributary Dewatto Bay (67)** | | | | | | |
| 11401 | 8453 | 5030 | 5-28-52 | Unnamed stream | (b) (6) [redacted] | 0.01 | 23/3W | Govt. Lot 5 | 28 | Dom. | S, D |
| | | | | | **Dewatto Creek Tributary Dewatto Bay (70)** | | | | | | |
| 5423 | 3324 | 1822 | 4-21-41 | Unnamed stream | (b) (6) [redacted] | 0.03 | 23/3W | SENW | 23 | Dom. (0.01) & Garden Irr. 2 Ac. (0.02) | S |
| 6027 | 3873 | 3842 | 5-12-44 | Unnamed stream | | 0.30 | 23/2W | SWSE | 6 | Dom. (0.01) & Irr. 30 Ac. (0.29) | S, F |
| | | | | | **Unnamed Stream Tributary Hood Canal (82)** | | | | | | |
| 7642 | 5475 | 6123 | 2-17-47 | Unnamed stream | (b) (6) [redacted] | 0.10 | 23/3W | Govt. Lot 4 | 2 | Dom. (0.02), Fish & Power (0.08) | S |
| 12618 | 12420 | | 10-16-53 | Unnamed stream | | 0.10 | 23/3W | Govt. Lot 5<br>W½SE | 2 | Com. Dom. | S, D |
| | | | | | **Unnamed Stream Tributary Hood Canal (85)** | | | | | | |
| 7978 | 5527 | 3173 | 8-12-47 | Unnamed stream | (b) (6) [redacted] | 0.25 | 24/3W | Govt. Lot 3 | 35 | Power (0.24) & Dom. (0.01) | --- |
| | | | | | **Unnamed Stream Tributary Hood Canal (93)** | | | | | | |
| 17381 | 12788 | | 7-2-62 | Unnamed spring | (b) (6) [redacted] | 0.10 | 24/2W | Govt. Lot 3 | 19 | Group Dom. | S |
| | | | | | **Unnamed Stream Tributary Hood Canal (94)** | | | | | | |
| 13046 | 9795 | 6062 | 7-29-54 | Unnamed spring | (b) (6) [redacted] | 0.01 | 24/2W | Govt. Lot 2 | 19 | Dom. | S |

* Diversion allowed from Unnamed spring, Hall Creek and Haddy Creek, total not to exceed 0.16 cfs.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Thomas Creek Tributary Hood Canal (95) | | | | | | |
| 2471 | 1283 | 338 | 12-4-28 | Unnamed stream | (b) (6) [redacted] | 0.01 | 24/2W | Govt. Lot 2 | 19 | Dom. | --- |
| | | | | | Nellita Creek Tributary Hood Canal (103) | | | | | | |
| 3385 | 2330 | 1578 | 9-19-33 | Nellita Creek | (b) (6) [redacted] | 0.02 | 24/2W | SWNE | 9 | Irr. 1 Ac. (0.01) & Dom. (0.01) | --- |
| 16837 | 12530 | 8390 | 8-9-61 | Nellita Creek & unnamed springs | | 0.15 | 24/2W | SENE | 9 | Com. Dom. | S |
| | | | | | Boyce Creek Tributary Hood Canal (111) | | | | | | |
| 7438 | 5009 | 3154 | 9-16-46 | Unnamed stream | (b) (6) [redacted] | 0.02 | 24/2W | Govt. Lot 1 | 3 | Irr. 2 Ac. (0.01) & Dom. (0.01) | S |
| | | | | | Unnamed Stream Tributary Seabeck Bay (115) | | | | | | |
| 14973 | 11144 | 7457 | 8-6-58 | Unnamed spring | (b) (6) [redacted] | 0.01 | 25/1W | NE | 30 | Dom. | S |
| | | | | | Seabeck Creek Tributary Seabeck Bay (117) | | | | | | |
| 10455 | 7641 | 6649 | 7-2-51 | Unnamed spring | (b) (6) [redacted] | 0.01 | 25/1W | NENW | 29 | Dom. | S, D |
| 12171 | 9065 | 6541 | 3-18-53 | Seabeck Creek | | 0.02 | 25/1W | NENW | 29 | Irr. 2 Ac. | S, D |
| 12718 | 9677 | 6370 | 1-12-54 | Unnamed spring | | 0.02 | 25/1W | $N\frac{1}{2}SW$ | 29 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| | | | | | Unnamed Stream Tributary Seabeck Bay (118) | | | | | | |
| 10445 | 7831 | 6389 | 6-27-51 | Unnamed stream | (b) (6) [redacted] | 0.02 | 25/1W | Govt. Lot 5 | 20 | Dom. (0.01) & Fish Pond (0.01) | S, D |
| 10453 | 7933 | 4645 | 7-2-51 | Unnamed stream | | 0.01 | 25/1W | Govt. Lot 5 | 20 | Irr. 5 Ac. | S, D |
| | | | | | Unnamed Spring Tributary Seabeck Bay | | | | | | |
| 9404 | 7036 | 5202 | 2-21-50 | Unnamed spring | (b) (6) [redacted] | 0.01 | 25/1W | Govt. Lot 2 | 21 | Dom. | S |
| | | | | | Unnamed Spring Tributary Hood Canal | | | | | | |
| 8959 | 6250 | 5504 | 8-3-49 | Unnamed spring | (b) (6) [redacted] | 0.01 | 25/1W | Govt. Lot 1 | 16 | Dom. | --- |
| Certificate of Change 638 | | | | | | | | | | | |
| | | | | | Big Beef Creek Tributary Big Beef Harbor (121) | | | | | | |
| 6569 | 4537 | 2544 | 8-2-45 | Unnamed stream | (b) (6) [redacted] | 0.06 | 25/1W | SWSW | 23 | Power (ram) (0.05) & Dom. (0.01) | --- |
| 16932 | 12622 | | 9-26-61 | Big Beef Creek | Symington of Seattle | 5.00 | 24/1W | $E\frac{1}{2}E\frac{1}{2}$ | 5 | Recreation & Beautification | C |
| R16933 | | | 9-26-61 | Big Beef Creek | Symington of Seattle | 800 a.f. | 24/1W | $E\frac{1}{2}E\frac{1}{2}$ | 5 | Recreation & Beautification | C |
| 17242 | 12715 | | 4-19-62 | Unnamed stream | (b) (6) [redacted] | 0.05 | 24/1W | NESE | 4 | Com. Dom. | S |
| | | | | | Spring Creek Tributary Big Beef Harbor (122) | | | | | | |
| 12723 | 9993 | 7267 | 1-13-54 | Spring Creek | (b) (6) [redacted] | 0.50 | 25/1W | NENE<br>Govt. Lot 5 | 22<br>15 | Fish Prop. | --- |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Johnson Creek Tributary Hood Canal (123)** | | | | | | | | | | | |
| 3494 | 1833 | 841 | 8-28-31 | Johnson Creek | [redacted] | 0.25 | 25/1W | SW¼ & Govt. Lot 1 | 14 | Fish Prop. Ponds | --- |
| Certificate of Change | | 429 | | | | | | | | | |
| 14069 | 10993 | 7522 | 9-7-56 | Unnamed springs | | 0.01 | 25/1W | Govt. Lot 2 | 14 | Dom. | --- |
| **Anderson Creek Tributary Hood Canal (124)** | | | | | | | | | | | |
| 9781 | 7042 | 6771 | 7-21-50 | Unnamed pond | [redacted] | 0.15 | 25/1W | NENW | 13 | Irr. 15 Ac. | --- |
| **Unnamed Stream Tributary Hood Canal (125)** | | | | | | | | | | | |
| 7369 | 5131 | | 8-7-46 | Unnamed spring | [redacted] | 0.04 | 25/1W | Govt. Lot 4 | 12 | Dom. (0.01) & Irr. 4.5 Ac. (0.03) | S |
| **Unnamed Stream Tributary Hood Canal (128)** | | | | | | | | | | | |
| 5713 | 3570 | 1895 | 6-16-42 | Unnamed stream | [redacted] | 0.05 | 25/1W | SESE | 1 | Dom. (0.01), Power (0.03), & Irr. 2 Ac. (0.01) | --- |
| **Unnamed Stream Tributary Hood Canal (131)** | | | | | | | | | | | |
| 4818 | 2776 | 1360 | 5-9-39 | Unnamed stream | [redacted] | 0.01 | 26/1W | SESE | 36 | Dom. & Irr. 1 Ac. | --- |
| **Unnamed Stream Tributary Hood Canal (132)** | | | | | | | | | | | |
| 4495 | 2540 | 1225 | 2-4-38 | Unnamed stream | [redacted] | 0.05 | 26/1W | NESE | 36 | Dom. (0.01) & Irr. 1 Ac. (0.04) | --- |
| **Unnamed Stream Tributary Hood Canal (135)** | | | | | | | | | | | |
| 4242 | 2352 | 994 | 6-24-36 | Unnamed stream | [redacted] | 0.01 | 26/1E | SESW | 18 | Dom. & Irr. 4 Ac. | --- |
| **Unnamed Stream Tributary Hood Canal (137)** | | | | | | | | | | | |
| 5337 | 3259 | 1777 | 1-23-41 | Unnamed stream | [redacted] | 0.03 | 26/1E | Govt. Lot 5 | 18 | Dom. (0.02) & Irr. ½ Ac. (0.01) | --- |
| **Unnamed Tributary Hood Canal (143)** | | | | | | | | | | | |
| 15425 | 11485 | 7739 | 4-28-59 | Pond in unnamed stream | [redacted] | 0.02 | 26/1E | NWSW | 4 | Irr. 2 Ac. | --- |
| 15794 | 11719 | 7776 | 12-9-59 | Unnamed stream | | 0.01 | 26/1E | Govt. Lot 1 | 5 | Dom. | S, D |
| **Jump-Off Creek Tributary Hood Canal (146)** | | | | | | | | | | | |
| 3565 | 1925 | 708 | 11-27-31 | Jump-Off Creek | [redacted] | 0.01 | 27/1E | Govt. Lot 1 | 27 | Irr. 2 Ac. & Dom. | --- |
| 12729 | 9513 | 5755 | 1-20-54 | Jump-Off Creek | | 0.50 | 27/1E | NWSE | 27 | Sand & gravel washing | --- |
| **Unnamed Stream Tributary Hood Canal (147)** | | | | | | | | | | | |
| 8743 | 5968 | 5707 | 4-1-49 | Unnamed stream | [redacted] | 0.07 | 27/1E | Govt. Lot 1 | 27 | Dom. (0.01), Fish (0.05) & Irr. 2 Ac. (0.01) | S |
| 14945 | 11112 | 7408 | 7-29-58 | Unnamed stream | | 0.014 | 27/1E | Govt. Lot 4 | 22 | Dom. (0.01) & Irr. 3 Ac. (0.004) | S |
| **Unnamed Springs Tributary Hood Canal** | | | | | | | | | | | |
| 15052 | 11183 | | 9-4-58 | Unnamed springs | [redacted] | 0.13 | 27/1E | Govt. Lot 4 | 22 | Dom. (0.04) & Irr. 9 Ac. (0.09) | --- |
| **Unnamed Stream Tributary Hood Canal (148)** | | | | | | | | | | | |
| 9473 | 7026 | 4533 | 3-21-50 | Unnamed spring | [redacted] | 0.02 | 27/1E | NENE | 27 | Dom. | S |
| 15388 | 11382 | | 4-10-59 | Unnamed stream | | 0.02 | 27/1E | SENE | 27 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Unnamed Stream Tributary Hood Canal (149) | | | | | | |
| 2594 | 1334 | 732 | 5-18-29 | Unnamed stream | (b) (6) [redacted] | 0.10 | 27/1E | Govt. Lot 1 | 22 | Dom. (0.01) & Irr. 6 Ac. (0.09) | --- |
| 4874 | 2795 | 1727 | 6-9-39 | Unnamed spring | | 0.20 | 27/1E | SWNW | 23 | Irr. 17 Ac. | --- |
| 8954 | 6158 | 5337 | 8-3-49 | Unnamed stream | | 0.20 | 27/1E | NESE | 26 | Irr. 20 Ac. | --- |
| 12782 | 9686 | 5941 | 2-23-54 | Unnamed stream | | 0.03 | 27/1E | SENW | 23 | Irr. 3 Ac. | --- |
| 13556 | 10234 | 6552 | 8-15-55 | Unnamed spring | | 0.01 | 27/1E | NENE | 26 | Dom. | --- |
| 14467 | 10891 | 7274 | 8-28-57 | Unnamed spring | | 0.04 | 27/1E | NESW | 23 | Irr. 2 Ac. (0.02) & Dom. (0.02) | --- |
| 15851 | 11733 | 7777 | 1-18-60 | Unnamed stream | | 0.01 | 27/1E | NWNE | 23 | Dom. | S, D |
| 16364 | 12207 | | 9-28-60 | Unnamed stream | | 0.30 | 27/1E | SENE | 26 | Irr. 30 Ac. | --- |
| 16886 | 12634 | | 9-6-61 | Unnamed springs & stream | | 0.31 | 27/1E | W½NE | 26 | Dom. (0.01) & Irr. 30 Ac. (0.30) | S, D |
| 16898 | 12526 | | 9-13-61 | Unnamed stream & spring | | 0.06 | 27/1E | W½NE | 26 | Dom. (0.01) & Irr. 5 Ac. (0.05) | S |
| | | | | | Fern Creek Tributary Hood Canal (150) | | | | | | |
| 11723 | 8493 | 5064 | 10-1-52 | Fern Creek | (b) (6) [redacted] | 0.01 | 27/1E | Govt. Lot 2 | 14 | Dom. | S, D |
| 13473 | 10148 | 6774 | 6-14-55 | Fern Creek | | 0.02 | 27/1E | NENE | 23 | Dom. (0.01) & Irr. 1 Ac. (0.01) | S, D |
| 13474 | 10138 | 7059 | 6-14-55 | Fern Creek | | 0.02 | 27/1E | SWSE | 14 | Dom. (0.01) & Irr. ½ Ac. (0.01) | S, D |
| 13475 | 10155 | 6708 | 6-14-55 | Fern Creek | | 0.02 | 27/1E | SWSE | 14 | Dom. (0.01) & Irr. 1 Ac. (0.01) | S, D |
| | | | | | Hudson Creek Tributary Hood Canal (152) | | | | | | |
| 5356 | 3418 | 3182 | 2-12-41 | Hudson Creek | (b) (6) [redacted] | 0.03 | 27/1E | Govt. Lot 2 | 13 | Dom. (0.01) & Irr. 1½ Ac. (0.02) | --- |
| | | | | | Unnamed Stream Tributary Hood Canal (153) | | | | | | |
| 15978 | 11812 | 7848 | 4-1-60 | Unnamed stream | (b) (6) [redacted] | 0.03 | 27/1E | Govt. Lot 3 | 12 | Dom. (0.01) & Irr. 2 Ac. (0.02) | --- |
| | | | | | Unnamed Stream Tributary Hood Canal (154) | | | | | | |
| 7219 | 4897 | 2763 | 6-7-46 | Unnamed stream | (b) (6) [redacted] | 0.01 | 27/1E | SESE | 12 | Dom. | --- |
| | | | | | Gamble (Christianson's) Creek Tributary Port Gamble (158) | | | | | | |
| 5855 | 3772 | 1993 | 6-24-43 | Unnamed spring | (b) (6) [redacted] | 0.10 | 27/2E | Govt. Lot 4 | 20 | Dom. (0.04), Fish, & Irr. lawn & garden (0.06) | --- |
| Certificate of Change 595 | | | | | | | | | | | |
| 6759 | 4453 | 2502 | 11-14-45 | Gamble Creek | | 0.15 | 27/2E | NENE | 31 | Irr. 15 Ac. | S |
| 7010 | 4547 | 6582 | 3-28-46 | Gamble Creek | | 0.03 | 27/2E | NWSW | 29 | Irr. 3 Ac. | S, F |
| 9393 | 6880 | 4468 | 2-17-50 | Gamble Creek | | 0.20 | 26/2E | SWNW | 7 | Irr. 20 Ac. | S, D, F |
| 12580 | 9564 | 6624 | 9-17-53 | Gamble Creek | | 0.07 | 26/2E | N½NE | 6 | Irr. 7 Ac. | S, D, F |
| 13044 | 9777 | 6135 | 7-27-54 | Unnamed stream | | 0.01 | 27/2E | Govt. Lot 4 | 20 | Dom. | S, D |
| 15121 | 11363 | | 9-30-58 | Unnamed creek & pond | | 0.09 | 26/2E | NENE | 6 | Dom. (0.01) & Irr. 8 Ac. (0.08) | --- |
| 15645 | 11669 | | 8-25-59 | Gamble Creek | | 0.13 | 27/2E | NENE | 31 | Dom. (0.01) & Irr. 12 Ac. (0.12) | S, D |
| 16421 | 12166 | | 11-2-60 | Gamble Creek | | 0.10 | 26/2E | NESW | 7 | Irr. 10 Ac. | S |
| 16902 | 12575 | | 9-15-61 | Gamble Creek | | 0.03 | 26/2E | SESW | 7 | Dom. (0.01), Stock (0.01) & Irr. 1 Ac. (0.01) | S |
| | | | | | Unnamed Springs Tributary Port Gamble (159) | | | | | | |
| 15263 | 11351 | 8237 | 1-29-59 | Unnamed springs | (b) (6) [redacted] | 0.02 | 27/2E | Govt. Lot 5 | 20 | Dom. (0.01) & Irr. 1 Ac. (0.01) | S |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Finland Creek Tributary Admiralty Inlet (169) | | | | | | |
| 5019 | 2926 | 1696 | 11-13-39 | Finland Creek | (b) (6) [redacted] | 0.01 | 28/2E | NWNE | 21 | Dom. | --- |
| 7515 | 5170 | 3539 | 10-30-46 | Milky Way Stream | | 0.15 | 28/2E | SESE | 21 | Fish (0.02) & Irr. 20 Ac. (0.13) | S |
| 10181 | 7279 | | 3-10-51 | Finland Creek | | 0.05 | 28/2E | SWSE | 16 | Irr. 5 Ac. | S, D |
| 15430 | 11475 | | 4-29-59 | Unnamed stream | | 0.15 | 28/2E | SESE | 21 | Irr. 15 Ac. | --- |
| 16093 | 11992 | 8331 | 5-31-60 | Finland Creek | | 0.04 | 28/2E | SWSE | 16 | Dom. (0.02) & Commercial (0.02) | S, D |
| 16316 | 12196 | 8255 | 9-1-60 | Finland Creek | | 0.03 | 28/2E | NWNE | 21 | Dom. (0.01) & Irr. 2 Ac. (0.02) | S |
| | | | | | Unnamed Stream Tributary Puget Sound (172) | | | | | | |
| 10097 | 7213 | 5179 | 1-30-51 | Unnamed stream | (b) (6) [redacted] | 0.10 | 28/2E | NWNE | 34 | Trout Pond | --- |
| 17052 | 12596 | | 11-6-61 | Unnamed stream | | 0.05 | 28/2E | NWNE | 34 | Irr. 5 Ac. | S |
| | | | | | Silver (Eglon) Creek Tributary Puget Sound (173) | | | | | | |
| 6707 | 4387 | 3211 | 10-8-45 | Silver Creek | (b) (6) [redacted] | 0.05 | 27/2E | Govt. Lot 2 | 2 | Group Dom. | S |
| | | | | | Unnamed Stream Tributary Puget Sound (174) | | | | | | |
| 7966 | 5482 | 3010 | 8-6-47 | Unnamed stream | (b) (6) [redacted] | 0.03 | 27/2E | NENW | 11 | Irr. 2 Ac. (0.02) & Dom. (0.01) | --- |
| | | | | | Unnamed Spring Tributary Puget Sound | | | | | | |
| 17440 | 12896 | | 8-7-62 | Unnamed spring | (b) (6) [redacted] | 0.01 | 27/2E | Govt. Lot 1 | 24 | Dom. | S |
| 15836 | 11723 | 8143 | 1-5-60 | Unnamed stream | | 0.07 | 27/2E | Govt. Lot 4 | 2 | Dom. (0.01), Stock (0.01) & Irr. 5 Ac. (0.05) | S |
| | | | | | Unnamed Spring Tributary Puget Sound | | | | | | |
| 12804 | 9639 | 7020 | 3-10-54 | Unnamed spring | (b) (6) [redacted] | 0.007 | 27/2E | Govt. Lot 1 | 25 | Dom. | --- |
| | | | | | Unnamed Spring Tributary Appletree Cove (180) | | | | | | |
| 14717 | 11032 | 7860 | 3-25-58 | Unnamed springs | (b) (6) [redacted] | 0.02 | 27/2E | SENE | 26 | Irr. 2 Ac. | S |
| 15452 | 11488 | 7720 | 5-11-59 | Unnamed spring | | 0.01 | 27/2E | NENE | 26 | Dom. | S |
| | | | | | Unnamed Pond Tributary Appletree Cove | | | | | | |
| 2887 | 1528 | 482 | 3-19-30 | Unnamed pond | (b) (6) [redacted] | 0.01 | 27/2E | NWSE & SWNE | 26 | Dom. | --- |
| | | | | | Carpenter Lake Drainage Tributary Appletree Cove (181) | | | | | | |
| 14293 | 11085 | 7891 | 4-17-57 | Unnamed stream | (b) (6) [redacted] | 0.11 | 27/2E | NENW | 26 | Dom. (0.01), Fish, & Irr. 10 Ac. (0.10) | --- |
| 14454 | 10908 | 8109 | 8-21-57 | Unnamed stream | | 0.07 | 27/2E | SWSW | 23 | Irr. 7 Ac. | --- |
| 14712 | 11054 | 7559 | 3-21-58 | Unnamed spring & stream | | 0.05 | 27/2E | NWNW | 26 | Irr. 5 Ac. | S |
| 15083 | 11874 | 7926 | 9-12-58 | Unnamed stream | | 0.10 | 27/2E | SESE | 22 | Fish (0.09) & Dom. (0.01) | S, F |
| 16087 | 12345 | 8196 | 5-26-60 | Reservoir in unnamed stream | | 0.10 | 27/2E | SESW | 23 | Irr. 10 Ac. | --- |
| 16315 | 12234 | | 9-1-60 | Unnamed stream | | 0.01 | 27/2E | NWSW | 22 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Appletree Cove (184) | | | | | | |
| 5529 | 3394 | 2681 | 7-29-41 | Unnamed stream | (b) (6) [redacted] | 0.06 | 26/2E | SESE | 2 | Dom. (0.01), Stock & Irr. 20 Ac. (0.05) | F |
| 10643 | 7731 | 6388 | 8-22-51 | Reservoir in unnamed stream | | 0.14 | 26/2E | NWNW | 1 | Stock (0.005) & Irr. 29 Ac. (0.135) | S |
| 11815 | 8783 | 5211 | 11-5-52 | Unnamed stream | | 0.01 | 26/2E | S½SW | 1 | Dom. | --- |
| 15398 | 11507 | | 4-16-59 | Reservoir in unnamed stream | | 0.31 | 26/2E | SWNW | 1 | Irr. 31 Ac. | C |
| | | | | | Unnamed Spring Tributary Puget Sound | | | | | | |
| 16269 | 11972 | 8013 | 8-15-60 | Unnamed spring | (b) (6) [redacted] | 0.01 | 26/2E | Govt. Lot 2 | 1 | Dom. | S |

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Unnamed Stream Tributary Port Madison (187) | | | | | | |
| 1705 | 863 | 318 | 5-7-26 | Unnamed stream | [redacted] | 0.02 | 26/2E | Govt. Lot 3 | 15 | Irr. 2 Ac. | --- |
| Certificate of Change 452 | | | | | | | | | | | |
| 3526 | 1837 | 1622 | 10-1-31 | Unnamed stream | | 0.15 | 26/2E | NENE | 15 | Municipal supply | --- |
| | | | | | Unnamed Stream Tributary Port Madison (188) | | | | | | |
| 3761 | 2002 | 894 | 12-7-32 | Unnamed stream | [redacted] | 0.02 | 26/2E | NENW | 15 | Dom. (0.01) & Irr. 0.5 Ac. (0.01) | --- |
| 8782 | 5986 | 3730 | 5-10-49 | Unnamed spring | | 0.025 | 26/2E | NWNE | 10 | Irr. 2.5 Ac. | --- |
| | | | | | Unnamed Stream Tributary Miller Bay (Squaib Bay) (189) | | | | | | |
| 16396 | 12187 | 8060 | 10-20-60 | Unnamed stream | [redacted] | 0.04 | 26/2E | Govt. Lot 7** | 9 | Dom. (0.01) & Irr. 3 Ac. (0.03) | --- |
| 16397 | 12188 | 8061 | 10-20-60 | Unnamed stream | | 0.04 | 26/2E | Govt. Lot 7** | 9 | Dom. (0.01) & Irr. 3 Ac. (0.03) | --- |
| 16492 | 12248 | 8107 | 1-12-61 | Unnamed stream | | 0.01 | 26/2E | Govt. Lot 6** | 9 | Dom. | S |
| 16512 | 12295 | 8147 | 1-30-61 | Unnamed stream | | 0.02 | 26/2E | NESE | 9 | Dom. (0.01) & Irr. 1 Ac. (0.01) | S, D |
| | | | | | Unnamed Stream Tributary Miller Bay (191) | | | | | | |
| 8551 | 5788 | 3331 | 8-11-48 | Unnamed stream | [redacted] | 0.02 | 26/2E | SESW | 4 | Dom. (0.01), Stock & Irr. 1 Ac. (0.01) | S |
| | | | | | Grovers Creek Tributary Miller Bay (192) | | | | | | |
| 5781 | 3723 | 4352 | 1-9-43 | Unnamed stream | [redacted] | 0.04 | 26/2E | NWSE | 4 | Dom. (0.01) & Irr. 6 Ac. (0.03) | --- |
| 6639 | 4309 | 4832 | 8-31-45 | Unnamed stream | | 0.04 | 26/2E | NWSE | 5 | Dom. (0.01) & Irr. 3 Ac. (0.03) | --- |
| 8161 | 5490 | 4783 | 12-26-47 | Unnamed stream | | 0.06 | 27/2E | NESE | 33 | Dom. (0.01), Fish Prop. & Irr. 5 Ac. (0.05) | --- |
| 13949 | 10428 | 6741 | 6-28-56 | Unnamed stream | | 0.02 | 27/2E | SENW | 34 | Dom. (0.01) & Irr. 1 Ac. (0.01) | S, D |
| 14014 | 10594 | 7190 | 8-7-56 | Unnamed stream | | 0.02 | 27/2E | SENW | 34 | Dom. (0.01) & Irr. 1 Ac. (0.01) | S, D |
| 14734 | 11154 | 7906 | 4-3-58 | Unnamed stream | | 0.085 | 26/2E | NESE | 5 | Irr. 8.5 Ac. | S, D |
| 15764 | 11656 | | 11-9-59 | Unnamed stream | | 0.07 | 27/2E | NENW | 27 | Irr. 6.5 Ac. | --- |
| | | | | | Unnamed Spring Tributary Miller Bay | | | | | | |
| 17315 | 12810 | | 5-29-62 | Unnamed spring | [redacted] | 0.08 | 26/2E | Govt. Lot 1 | 4 | Irr. 3 Ac. (0.03) & Fish Prop. (0.05) | S |
| 17435 | 12849 | | 8-2-62 | Unnamed spring | | 0.01 | 26/2E | Govt. Lot 1 | 4 | Irr. ½ Ac. | S |
| | | | | | Unnamed Stream Tributary Miller Bay (196) | | | | | | |
| 6441 | 4154 | 2309 | 5-19-45 | Unnamed stream | [redacted] | 0.03 | 26/2E | Govt. Lot 4 | 16 | Group Dom. | S |
| Certificate of Change 712 | | | | | | | | | | | |
| 6516 | 4230 | | 7-6-45 | Unnamed stream | | 0.04 | 26/2E | SESE | 8 | Stock (0.01), Dom. (0.02) & Irr. 1 Ac. (0.01) | S |
| 9928 | 7085 | 5178 | 9-30-50 | Unnamed stream | | 0.02 | 26/2E | NESE | 17 | Dom. (0.01), Stock & Irr. 3 Ac. (0.01) | --- |
| 15410 | 11431 | 7577 | 4-24-59 | Unnamed stream | [redacted] et al | 0.06 | 26/2E | NENE | 17 | Com. Dom & Fire Protection | --- |
| | | | | | Unnamed Stream Tributary Miller Bay (197) | | | | | | |
| 9700 | 7181 | 6934 | 6-19-50 | Unnamed stream | [redacted] | 0.03 | 26/2E | Govt. Lot 6 | 16 | Irr. 3 Ac. | S |
| 12937 | 9673 | 5987 | 5-24-54 | Three unnamed springs | | 0.01 | 26/2E | NESW | 16 | Dom. | S D |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Thompson Creek Tributary Agate Passage (198)** | | | | | | |
| 4611 | 2671 | 1231 | 8-29-38 | Thompson Creek | (b) (6) [redacted] | 0.04 | 26/2E | SESW | 20 | Irr. 2 Ac. | --- |
| 5081 | 3196 | 2801 | 2-17-40 | Thompson Creek | | 0.05 | 26/2E | NWSE | 29 | Irr. 4 Ac. | --- |
| | | | | | **Unnamed Stream Tributary Agate Passage (200)** | | | | | | |
| 4049 | 2575 | 1508 | 11-2-34 | Unnamed springs | Sandy Hook Park Community Club | 0.10 | 26/2E | NESE SENE | 31 | Municipal supply | --- |
| | | | | | **Unnamed Stream Tributary Port Orchard (201)** | | | | | | |
| 17122 | 12721 | | 1-31-62 | Unnamed stream | (b) (6) [redacted] | 0.80 | 26/2E | SENW | 30 | Irr. 80 Ac. | S |
| | | | | | **Unnamed Stream (Hadesat Creek) Tributary Port Orchard (202)** | | | | | | |
| 8473 | 5784 | 3262 | 6-15-48 | Unnamed stream | (b) (6) [redacted] | 0.01 | 26/1E | NWSE | 24 | Dom. | S |
| 8490 | 5785 | 3440 | 6-22-48 | Unnamed spring | | 0.01 | 26/1E | SENE | 24 | Stock & Irr. 1 Ac. | S |
| 10731 | 7747 | 6316 | 9-14-51 | Unnamed stream | | 0.10 | 26/1E | NESE | 24 | Dom. (0.01) & Irr. 10 Ac. (0.09) | S |
| 14111 | 10527 | 7745 | 10-9-56 | Unnamed spring & stream | | 0.11 | 26/1E | NESE | 24 | Dom. (0.01) & Irr. 10 Ac. (0.10) | --- |
| | | | | | **Unnamed Stream Tributary Port Orchard (203)** | | | | | | |
| 3473 | 1807 | 750 | 8-10-31 | Unnamed stream | (b) (6) [redacted] | 0.02 | 26/1E | SESW | 24 | Dom. (0.01) & Irr. 1.5 Ac. (0.01) | --- |
| 7971 | 5487 | 3045 | 8-9-47 | Unnamed stream | | 0.01 | 26/1E | Govt. Lot 3 | 25 | Irr. 0.5 Ac. | S |
| 16166 | 11888 | | 7-6-60 | Unnamed stream | | 0.12 | 26/1E | SENW | 24 | Irr. 12 Ac. | --- |
| | | | | | **Unnamed Stream Tributary Liberty Bay (206)** | | | | | | |
| 10614 | 7590 | 5477 | 8-14-51 | Unnamed stream | (b) (6) [redacted] | 0.01 | 26/1E | SENW | 23 | Dom. | S |
| | | | | | **Dogfish Creek Tributary Liberty Bay (207)** | | | | | | |
| 4754 | 2932 | 2226 | 3-7-39 | Unnamed stream | (b) (6) [redacted] | 0.01 | 27/1E | SWNW | 36 | Irr. 5 Ac. & Dom. | L |
| 5585 | 3524 | 2115 | 9-24-41 | Unnamed stream | | 1.20 | 26/1E | SWNW | 2 | Municipal supply | --- |
| 5926 | 3782 | 2040 | 11-24-43 | Unnamed spring | | 0.01 | 27/1E | SWNW | 35 | Dom. | --- |
| 6509 | 4217 | 2853* | 7-2-45 | Unnamed stream & W. Fork Dogfish Creek | | 0.10 | 26/1E | N½SW | 2 | Irr. 20 Ac. | S |
| 6992 | 4668 | 3381 | 3-21-46 | W. Fork Dogfish Creek | | 0.30 | 26/1E | NESW | 2 | Irr. 30 Ac. | S, F |
| 8941 | 6175 | 3550 | 7-28-49 | W. Fork Dogfish Creek | | 0.06 | 26/1E | E½SW | 2 | Irr. 6 Ac. (0.05) & Stock (0.01) | S |
| 9488 | 6872 | 4207 | 3-27-50 | Unnamed stream & E. Fork Dogfish (Yount) Creek | | 0.22 | 26/1E | S½NE | 12 | Irr. 22 Ac. | S, F |
| 9953 | 7146 | 5690 | 10-20-50 | Unnamed stream & W. Fork Dogfish Creek | | 0.18 | 26/1E | NWNE | 11 | Irr. 8 Ac. (0.08) & Fish (0.10) | S, D, F, C |
| 9954 | 7071 | 4786 | 10-20-50 | W. Fork Dogfish Creek | | 0.15 | 26/1E | SWNE | 11 | Irr. 15 Ac. | S, D, F |
| 11362 | 8325 | 5932 | 5-15-52 | Dogfish Creek | | 0.05 | 26/1E | SESW | 11 | Irr. 5 Ac. | S, D, F |
| 11528 | 8499 | 5585 | 7-17-52 | Unnamed springs | | 1.00 | 26/1E | NESW | 2 | Municipal supply | --- |
| 13845 | 10368 | 6640 | 5-14-56 | Unnamed stream | | 0.03 | 26/1E | NENW | 14 | Irr. 3 Ac. | S, D |
| 13849 | 10378 | 6974 | 5-16-56 | Unnamed stream | | 0.02 | 26/1E | NENW | 14 | Irr. 2 Ac. | S, D |
| 13976 | 10411 | | 7-20-56 | Unnamed spring | | 0.21 | 26/1E | SENE | 2 | Dom. (0.01) & Irr. 26 Ac. (0.20) | --- |
| 14242 | 10944 | 7159 | 2-27-57 | Dogfish Creek | | 0.05 | 26/1E | SESW | 11 | Irr. 5 Ac. | S, F |
| 15295 | 11323 | 7852 | 2-25-59 | E. Fork Dogfish (Yount) Creek | | 0.13 | 26/1E | SWSE | 11 | Irr. 12 Ac. (0.12) & Dom. (0.01) | S, D |
| 15335 | 11514 | 8492 | 3-16-59 | E. Fork Dogfish (Yount) Cr. & W. Fork Dogfish Creek | | 0.02 | 26/1E | W½SE | 11 | Irr. 2 Ac. (0.01) & Dom. (0.01) | S, D, C |
| 16167 | 11995 | | 7-6-60 | Unnamed stream | | 0.15 | 26/1E | N½SE | 12 | Irr. 15 Ac. | S |
| 16334 | 12178 | | 9-15-60 | Unnamed spring & stream | | 0.21 | 26/1E | SENW | 12 | Irr. 20 Ac. (0.20) & Dom. (0.01) | --- |
| 16356 | 12197 | | 9-27-60 | Unnamed stream | | 0.14 | 26/1E | NENW | 12 | Irr. 14 Ac. & Stock | --- |
| 16431 | 12400 | 8525 | 10-24-60 | Unnamed spring | | 0.20 | 26/1E | NESW | 2 | Municipal supply | S |
| 16453 | 12531 | | 11-23-60 | Unnamed spring | | 0.01 | 26/1E | SENW | 12 | Stock | S |
| 16567 | 12317 | | 3-8-61 | Unnamed stream | | 0.06 | 26/1E | SESW | 2 | Irr. 11 Ac. (0.05) & Dom. (0.01) | S |

* Certificate in error, change required.

** Government lots 6 and 7 are identical – numbering error due to conflicting surveys.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Dogfish Creek Tributary Liberty Bay (207) - Continued | | | | | | |
| 16822 | 12489 | | 7-28-61 | W. Fork Dogfish Creek | (b) (6) [redacted] | 0.08 | 26/1E | NWSE | 11 | Irr. 8 Ac. | S, D, F |
| 17478 | | | 8-24-62 | Unnamed spring | | 0.01 | 27/1E | NWSW | 36 | Dom. | S |
| 17540 | | | 9-25-62 | Unnamed springs | | 0.30 | 26/1E | SWNW | 24 | Irr. 30 Ac. | --- |
| | | | | | Johnson Creek Tributary Liberty Bay (208) | | | | | | |
| 5553* | 3442 | 1997 | 8-11-41 | S. Fork Johnson Creek | (b) (6) [redacted] | 0.05 | 26/1E | Govt. Lot 3 | 22 | Dom. (0.01), Stock (0.01) & Irr. 1.5 Ac. (0.03) | --- |
| 6177 | 3942 | 2382 | 9-28-44 | Mid. Fork Johnson Creek | Viewside Community | 0.30 | 26/1E | NWNW | 22 | Dom. (0.12) & Power (0.18) | --- |
| 6395 | 4149 | 2280 | 4-25-45 | Unnamed stream | (b) (6) [redacted] | 0.01 | 26/1E | S½NW | 22 | Dom. | --- |
| 6708 | 4367 | 2426 | 10-9-45 | N. Fork Johnson Creek | | 0.03 | 26/1E | Govt. Lot 2 | 22 | Fish Prop. | S |
| 8367 | 5652 | 3271 | 5-3-48 | Mid. Fork Johnson Creek | | 1.00 | 26/1E | NWNW | 22 | Fish Culture | S |
| 12147 | 9037 | 5334 | 3-12-53 | S. Fork Johnson Creek | | 0.07 | 26/1E | SENW | 22 | Irr. 6¼ Ac. | S, D |
| 16813 | 12449 | | 7-25-61 | Two unnamed ponds | | 0.16 | 26/1E | SENW | 21 | Irr. 16 Ac. | --- |
| | | | | | Unnamed Stream Tributary Liberty Bay (209) | | | | | | |
| 5595 | 3634 | 2051 | 10-15-41 | Unnamed spring | (b) (6) [redacted] | 0.01 | 26/1E | NWSW | 22 | Dom. | --- |
| 5621 | 3500 | 1935 | 12-6-41 | Unnamed stream | | 0.01 | 26/1E | NWSW | 22 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Liberty Bay (210) | | | | | | |
| 5060 | 2994 | 2068 | 1-26-40 | Unnamed stream | (b) (6) [redacted] | 0.05 | 26/1E | Govt. Lot 4 | 22 | Group Dom. | --- |
| 16955 | 12548 | | 10-10-61 | Unnamed spring | | 0.01 | 26/1E | SWSW | 22 | Dom. | S |
| | | | | | Scandia Creek Tributary Liberty Bay (213) | | | | | | |
| 3778 | 2086 | 1925 | 1-23-33 | Scandia Creek | (b) (6) [redacted] | 0.03 | 26/1E | NWSE | 27 | Dom. (0.02) & Irr. 1 Ac. (0.01) | --- |
| 3859 | 2133 | 811 | 7-15-33 | Scandia Creek | A. Johnson for the Scandia Water-works Co. | 0.30 | 26/1E | NESW | 27 | Com. Dom. | --- |
| 6491 | 4180 | 2284 | 6-20-45 | Scandia Creek | (b) (6) [redacted] | 0.01 | 26/1E | SENW | 34 | Dom. | S |
| 11278 | 8193 | 5040 | 4-25-52 | Scandia Creek | | 0.09 | 26/1E | Govt. Lot 2 | 27 | Irr. 9 Ac. | S, D |
| 11455 | 8473 | 5372 | 6-16-52 | Scandia Creek | | 0.02 | 26/1E | Govt. Lot 2 | 27 | Irr. 2 Ac. | S, D, F |
| 12479 | 9258 | 5526 | 8-3-53 | Scandia Creek | | 0.01 | 26/1E | E½SW | 27 | Dom. | S, D |
| 16941 | 12578 | 8476 | 9-29-61 | Scandia Creek | | 0.01 | 26/1E | NESW | 27 | Dom. | S, D |
| 17363 | 12831 | | 6-25-62 | Scandia Creek | Scandia Waterworks Co. | 0.70 | 26/1E | NESW | 27 | Com. Dom. | S |
| | | | | | Jacques (Little Scandia) Creek Tributary Liberty Bay (214) | | | | | | |
| 12483 | 9322 | 6410 | 8-4-53 | Jacques Creek | (b) (6) [redacted] | 0.01 | 26/1E | SESE | 27 | Dom. | S, D |
| 12918 | 9672 | 6323 | 5-13-54 | Jacques Creek | | 0.02 | 26/1E | Govt. Lot 4 | 27 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| 13379 | 10022 | 6860 | 4-11-55 | Jacques Creek | | 0.01 | 26/1E | Govt. Lot 4 | 27 | Dom. | S, D |
| 14887 | 12059 | | 7-1-58 | Jacques Creek** | | 0.06 | 26/1E | SESE | 27 | Dom. (0.01) & Irr. 5 Ac. (0.05) | --- |
| | | | | | Perry Creek Tributary Liberty Bay (215) | | | | | | |
| 8978 | 6184 | 3496 | 8-8-49 | Perry Creek | (b) (6) [redacted] | 0.01 | 26/1E | NENE | 34 | Dom. | --- |
| 13028 | 9832 | 6557 | 7-19-54 | Unnamed stream | | 0.03 | 26/1E | SENE | 34 | Dom. (0.01) & Irr. 3 Ac. (0.02) | --- |
| 14887 | 12059 | | 7-1-58 | Perry Creek** | | 0.06 | 26/1E | SESE | 27 | Dom. (0.01) & Irr. 5 Ac. (0.05) | --- |
| 17314 | 12773 | | 5-29-62 | Unnamed stream (Perry Creek) | | 0.01 | 26/1E | NENE | 34 | Irr. 1½ Ac. | S |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Unnamed Stream Tributary Liberty Bay (216)** | | | | | | |
| 1157 | 439 | 153 | 8-5-24 | Unnamed stream | (b) (6) [redacted] | 0.40 | 26/1E | Govt. Lot 4 | 35 | Dom. (0.05) & Power (0.35) | --- |
| 11768 | 8780 | 5683 | 10-17-52 | Unnamed spring | | 0.02 | 26/1E | NESE | 34 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| | | | | | **Unnamed Stream Tributary Liberty Bay (217)** | | | | | | |
| 16198 | 11932 | 8590 | 7-22-61 | Unnamed spring | (b) (6) [redacted] | 0.02 | 26/1E | SWSW | 35 | Dom. (0.01) & Stock (0.01) | S |
| | | | | | **Unnamed Stream Tributary Liberty Bay (218)** | | | | | | |
| 5513 | 3382 | 2062 | 7-15-41 | Unnamed spring | (b) (6) [redacted] | 0.03 | 25/1E | SWNE | 2 | Com. Dom. | --- |
| | | | | | **Unnamed Stream Tributary Liberty Bay (219)** | | | | | | |
| 5007 | 2911 | 1765 | 10-25-39 | Unnamed stream | (b) (6) [redacted] et al | 0.01 | 26/1E | SWSE | 35 | Group Dom. | --- |
| | | | | | **Unnamed Stream Tributary Liberty Bay (220)** | | | | | | |
| 5054 | 2995 | 1363 | 1-23-40 | Unnamed stream | (b) (6) [redacted] | 0.02 | 26/1E | Govt. Lot 7 | 35 | Dom. | --- |
| | | | | | **Unnamed Stream Tributary Port Orchard (221)** | | | | | | |
| 11898 | 8798 | 5696 | 12-16-52 | Unnamed spring | (b) (6) [redacted] | 0.01 | 25/1E | NWNW | 1 | Dom. | S |
| 15044 | 11121 | 8242 | 9-2-58 | Unnamed stream | | 0.05 | 25/1E | NENE | 2 | Irr. 5 Ac. | S |
| | | | | | **Steel Creek Drainage (223)** | | | | | | |
| | | | | | **Steel (Brownsville) Creek Tributary Burke Bay** | | | | | | |
| R3607 | R109 | 771 | 3-2-32 | Steel Creek | (b) (6) [redacted] | 14 a.f. | 25/1E | NENE | 23 | Power & Fish Pond | --- |
| 3632 | 1933 | 770 | 5-9-32 | Steel Creek | | 0.50 | 25/1E | NENE | 23 | Dom. (0.01), Power & Fish Pond (0.49) | C |
| 5313 | 3226 | 1635 | 12-3-40 | Steel Creek | | 0.01 | 25/1E | SESE | 23 | Dom. | --- |
| 10237 | 7371 | 6193 | 4-10-51 | Steel Creek | | 0.01 | 25/1E | SESE | 23 | Dom. | S, D |
| | | | | | **Unnamed Tributaries Steel Creek** | | | | | | |
| 4356 | 2441 | 2086 | 3-4-37 | Unnamed stream | (b) (6) [redacted] | 0.20 | 25/1E | SWSE | 2 | Fish Ponds (0.14), Dom. (0.01) & Irr. 5 Ac. (0.05) | --- |
| 5609 | 3476 | 1827 | 11-10-41 | Unnamed spring | | 0.01 | 25/1E | NENE | 23 | Group Dom. | --- |
| 7320 | 4876 | 2713 | 7-13-46 | Unnamed brook | | 0.02 | 25/1E | NWSW | 25 | Dom. (0.01) & Fish (0.01) | --- |
| 7537 | 5027 | 3282 | 11-15-46 | Unnamed swamp | | 0.05 | 25/1E | NWSE | 11 | Irr. 5 Ac. | --- |
| 7741 | 5236 | 2873 | 4-7-47 | Unnamed stream | | 0.05 | 25/1E | SESE | 11 | Fish & Irr. 5 Ac. | S |
| 8086 | 5727 | 3225 | 10-22-47 | Unnamed stream | | 0.18 | 25/1E | SENE | 26 | Irr. 30 Ac. | --- |
| 8800 | 6030 | 3425 | 5-20-49 | Unnamed spring | | 0.01 | 25/1E | SWSW | 25 | Dom. | --- |
| 10907 | 7989 | 6140 | 12-5-51 | Unnamed brooklet | | 0.01 | 25/1E | SENE | 23 | Dom. | --- |
| 13010 | 9773 | 6392 | 7-7-54 | Unnamed stream | | 0.05 | 25/1E | NESE | 11 | Irr. 5 Ac. | S, F |
| 14553 | 10966 | 8419 | 10-22-57 | Unnamed creek | | 0.23 | 25/1E | SESW | 11 | Irr. 23 Ac. | --- |
| 16320 | 12243 | | 9-6-60 | Unnamed creek | | 0.17 | 25/1E | NESW | 11 | Fire Prot. & Irr. 17 Ac. | S, F |
| 16429 | 12236 | | 11-4-60 | Unnamed creek | | 0.15 | 25/1E | SWSE | 14 | Irr. 15 Ac. | S |
| | | | | | **Unnamed Stream Tributary Port Orchard (224)** | | | | | | |
| 7872 | 5275 | 3459 | 6-9-47 | Unnamed stream | (b) (6) [redacted] | 0.01 | 25/1E | Govt. Lot 3 | 24 | Dom. | --- |

* Certificate in error, change required.
** Diversion allowed from either Jacques or Perry Creeks - total not to exceed 0.06 c.f.s.

## KITSAP PENINSULA

### Unnamed Stream Tributary Port Orchard (225)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Location of Point of Diversion Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5508 | 3385 | 2142 | 7-12-41 | Unnamed stream | (b) (6) | 0.01 | 25/1E | NESE | 24 | Dom. | --- |
| 5509 | 3386 | 2143 | 7-12-41 | Unnamed stream | | 0.01 | 25/1E | NESE | 24 | Dom. | --- |
| 7595 | 4935 | 2802 | 1-15-47 | Unnamed stream | | 0.01 | 25/1E | NESE | 24 | Dom. | S |
| 7888 | 5281 | 3037 | 6-14-47 | Unnamed stream | | 0.02 | 25/1E | NESE | 24 | Irr. 2 Ac. | S |
| 8150 | 5530 | 3717 | 12-16-47 | Unnamed stream | | 0.02 | 25/1E | Govt. Lot 3 | 24 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |

### Unnamed Stream Tributary Port Orchard (226)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2943 | 1552 | 504 | 4-16-30 | Unnamed stream | (b) (6) | 0.01 | 25/1E | SESE | 24 | Dom., Stock, & Irr. 2 Ac. | --- |
| 17267 | 12755 | 8548 | 5-3-62 | Two unnamed springs | G. Pearson for Gilberton Water System | 0.52 | 25/1E | SESE | 24 | Com. Dom. | S |
| | | | | | | | 25/2E | NWSW | 19 | | --- |

### Illahee Creek Tributary Port Orchard (228)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1277 | 1434 | 407 | 3-2-25 | Three springs | The Illahee Improvement Club | 0.30 | 25/1E | SESE | 36 | Municipal supply | --- |
| 4097 | 2242 | 1506 | 4-19-35 | Illahee Creek | (b) (6) | 0.23 | 25/2E | Govt. Lot 4 | 31 | Dom. (0.01), Irr. 2 Ac. (0.02) & Fish Ponds (0.20) | --- |
| 9241 | 7065 | 4418 | 12-1-49 | Unnamed spring | | 0.01 | 25/1E | NWSE | 36 | Dom. | --- |
| 10482 | 7773 | 5601 | 7-10-51 | Unnamed lake | | 0.02 | 25/1E | NWSE | 25 | Dom. (0.01), Stock, & Irr. 25 Ac. (0.01) | S |

### Unnamed Stream Tributary Port Orchard (229)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5123 | 3073 | 1653 | 4-9-40 | Unnamed stream | (b) (6) | 0.07 | 24/2E | Govt. Lot 1 | 6 | Dom. (0.01) & Irr. 5 Ac. (0.06) | --- |

### Unnamed Stream Tributary Port Orchard (230)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13686*** | 10264 | 7810 | 12-16-55 | Unnamed springs | (b) (6) | 0.03 | 24/2E | SWNW | 6 | Dom. (0.01) & Irr. 2 Ac. (0.02) | --- |
| 2156 | 1067 | 550 | 9-1-27 | Unnamed spring | | 0.20 | 24/2E | Govt. Lot 2 | 6 | Dom. | --- |

### Unnamed Stream Tributary Port Orchard (234)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3275 | 1702 | 763 | 1-7-31 | Unnamed springs | (b) (6) | 0.05 | 24/2E | Govt. Lot 2 | 7 | Fish Ponds | --- |

### Enetai Spring Tributary Port Orchard (235)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3274 | 1701 | 762 | 1-7-31 | Enetai Spring | (b) (6) | 0.02 | 24/2E | Govt. Lot 2 | 7 | Dom. (0.01) & Irr. 3 Ac. (0.01) | --- |
| 7855 | 5233 | 3356 | 5-27-47 | Enetai Spring | Enetai Community Cooperative, Inc. | 0.01 | 24/2E | Govt. Lot 2 | 7 | Dom. | S |
| 8552 | 5991 | 4289 | 8-12-48 | Enetai Spring | Enetai Community Cooperative, Inc. | 0.03 | 24/2E | Govt. Lot 2 | 7 | Com. Dom. | --- |

### Unnamed Stream Tributary Port Washington Narrows (238)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5625 | 3621 | 2722 | 12-12-41 | Unnamed spring | (b) (6) | 0.02 | 25/1E | NESW | 36 | Dom. | --- |
| 6397 | 4140 | 2301 | 4-26-45 | Unnamed stream | | 0.01 | 24/1E | NENE | 11 | Dom. | --- |

### Unnamed Stream Tributary Port Washington Narrows (239)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3449 | 1790 | 830 | 7-15-31 | Unnamed stream | (b) (6) | 0.20 | 24/1E | Govt. Lot 2 | 3 | Dom. (0.01) & Irr. 10 Ac. (0.19) | --- |
| 5811 | 3700 | 2976 | 4-6-43 | Unnamed stream | Tracyton Water District | 0.10 | 24/1E | SWNW | 2 | Com. Dom. | --- |

Unnamed Stream Tributary Dyes Inlet (240)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6171 | 3951 | 2616 | 9-26-44 | Unnamed stream | (b) (6) [redacted] | 0.06 | 24/1E | Govt. Lot 1 | 3 | Dom. (0.01) & Irr. 7 Ac. (0.05) | --- |
| 6399 | 4332 | 4578 | 4-27-45 | Unnamed stream | | 0.05 | 24/1E | N½N½ | 3 | Stock (0.01) & Irr. 7 Ac. (0.04) | --- |

Mosher Creek Tributary Dyes Inlet (241)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3584 | 1997 | 2251 | 1-4-32 | Mosher Creek | (b) (6) [redacted] | 0.12 | 25/1E | Govt. Lot 4 | 34 | Dom. (0.01) & Irr. 14 Ac. (0.11) | --- |
| 15040 | 11165 | | 9-2-58 | Mosher Creek | | 0.04 | 25/1E | NENE | 34 | Irr. 4 Ac. | --- |
| 17543 | | | 9-24-62 | Mosher Creek | | 0.01 | 25/1E | NESE | 34 | Irr. 1 Ac. & Dom. | --- |

Unnamed Springs Tributary Dyes Inlet

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 17557 | 12944 | | 10-2-62 | Unnamed springs | (b) (6) [redacted] | 0.10 | 25/1E | SENE | 28 | Irr. 10 Ac. | S |

Unnamed Stream Tributary Dyes Inlet (244)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2587 | 1317 | 435 | 5-11-29 | Unnamed stream | (b) (6) [redacted] | 0.20 | 25/1E | NWNW | 27 | Dom. (0.01) & Irr. 7 Ac. (0.19) | --- |

Barker Creek Drainage (245)

Barker Creek Tributary Dyes Inlet

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6631 | 4311 | 2624 | 8-29-45 | Barker Creek | (b) (6) [redacted] | 0.12 | 25/1E | SWSE | 15 | Dom. (0.01) & Irr. 12 Ac. (0.11) | S |
| 6844 | 4479 | 2823 | 1-10-46 | Barker Creek | | 0.04 | 25/1E | NWSE | 10 | Irr. 4 Ac. | S |
| 7098 | 4975 | 3269 | 5-4-46 | Barker Creek | | 0.30 | 25/1E | W½NE | 22 | Irr. 40 Ac. | S, F |
| 13907 | 10381 | 8260 | 6-6-56 | Island Lake | Island Lake Bible Camp, Inc. | 0.04 | 25/1E | Govt. Lots 1 & 2 | 10 | Group Dom. (0.01) & Irr. 3 Ac. (0.03) | S |
| 15165 | 11265 | | 11-7-58 | Barker Creek | (b) (6) [redacted] | 0.60 | 25/1E | NESW | 22 | Fish (0.50) & Irr. 10 Ac. (0.10) | S, D, F |
| 15723 | 11740 | 8328 | 10-15-59 | Barker Creek | | 0.06 | 25/1E | NWNE | 15 | Stock (0.01) & Fish (0.05) | S |

Unnamed Tributaries Barker Creek

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5495 | 3390 | 1707 | 6-19-41 | Unnamed stream | (b) (6) [redacted] | 0.07 | 25/1E | SESW | 22 | Dom. (0.01), Stock, & Irr. 4 Ac. (0.06) | --- |
| 5978 | 3892 | 3609 | 3-9-44 | Unnamed creek | | 0.02 | 25/1E | NESE | 10 | Dom. (0.01) & Irr. 2 Ac. (0.01) | F |
| 8632 | 5959 | 3353 | 10-29-48 | Unnamed creek | | 0.03 | 25/1E | SESE | 10 | Irr. 3 Ac. | S, F |
| 9884 | 6858 | 5425 | 9-11-50 | Unnamed spring | | 0.20 | 25/1E | SENE | 3 | Irr. 20 Ac. | --- |
| 13060 | 9807 | 6068 | 8-3-54 | Unnamed stream | | 0.15 | 25/1E | NESW & SESW | 22 | Dom. (0.02) & Power (0.13) | S, D |
| 13143 | 9802 | 6067 | 9-29-54 | Unnamed spring | | 0.01 | 25/1E | SWNW | 23 | Dom. | S, D |

Clear Creek Tributary Dyes Inlet (246)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2117 | 1061 | 332 | 7-20-27 | Clear Creek | (b) (6) [redacted] | 0.50* | 25/1E | NESW | 4 | Dom. (0.01), Power (0.30) & Irr. 15 Ac. (0.19) | --- |
| 2727 | 2027 | 880 | 10-9-29 | Unnamed spring | | 0.02 | 25/1E | NENE | 16 | Dom. | --- |
| 4821 | 3065 | 3181 | 5-10-39 | Clear Creek | | 0.10 | 26/1E | SESW | 33 | Irr. 15 Ac. | --- |
| 6549 | 4228 | 2850 | 7-20-45 | Clear Creek & E. Fork Clear Creek | | 0.09** | 25/1E | NENW | 9 | Irr. 9 Ac. | S, F |
| 6927 | 8654 | 6169 | 2-25-46 | Clear Creek | | 0.05 | 25/1E | SENW | 9 | Irr. 10 Ac. | S, D, F |
| 7834 | 5607 | 5806 | 5-23-47 | Unnamed stream | | 0.01 | 26/1E | SWNE | 33 | Dom. | --- |
| 9410 | 6891 | 4138 | 2-23-50 | Clear Creek | | 0.05 | 25/1E | SWSE | 9 | Dom. (0.01), Fire Prot. & Irr. 4 Ac. (0.04) | S, D, F |
| 12321 | 9194 | 6381 | 1-19-53 | W. Fork Clear Creek | | 0.25 | 25/1E | SESW | 9 | Irr. 25 Ac. | S, D, F |

Unnamed Stream Tributary Dyes Inlet (247)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2257 | 1153 | 365 | 3-5-28 | Unnamed stream | (b) (6) [redacted] | 0.01 | 25/1E | SWNW | 16 | Dom. & Stock | --- |

* 0.3 c.f.s. must be returned to Clear Creek.
** Not more than 0.05 c.f.s. is to be diverted from either creek at any time.
*** Certificate in error, change required.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Strawberry Creek Drainage Tributary Dyes Inlet (248) | | | | | | |
| 6432 | 4158 | 2294 | 5-15-45 | Koch's (Cook's, Spring, Crystal) Creek | (b) (6) | 0.02 | 25/1E | SENW | 17 | Irr. 2 Ac. | S |
| 8824 | 6311 | 6399 | 6-6-49 | Koch's (Cook's, Spring, Crystal) Creek | | 0.02 | 25/1E | SENW | 17 | Irr. 2 Ac. | S, D, F |
| 14698 | 12078 | 8366 | 3-7-58 | Strawberry Creek | | 0.05 | 25/1E | NENE<br>SESE | 19<br>18 | Dom. (0.02), Stock (0.02) & Irr. 1 Ac. (0.01) | S |
| 15226 | 11366 | 7565 | 1-2-59 | Koch's (Cook's, Spring, (Crystal) Creek | | 0.01 | 25/1E | SESW | 17 | Dom. & Stock | S, D |
| | | | | | Knapp Creek Tributary Dyes Inlet (249) | | | | | | |
| 1330 | 552 | 102 | 5-22-25 | Knapp Creek | (b) (6) | 0.05 | 25/1E | Govt. Lot 3 | 20 | Dom. (0.01) & Irr. 2 Ac. (0.04) | --- |
| 17227 | 12726 | 8640 | 4-11-62 | Knapp Creek | | 0.10 | 25/1E | NESW | 20 | Irr. 10 Ac. | --- |
| | | | | | Unnamed Stream Tributary Dyes Inlet (250) | | | | | | |
| 2110 | 1077 | 846 | 7-8-27 | Unnamed stream | (b) (6) | 0.25 | 25/1E | SWSE | 20 | Fish Pond (0.21) & Irr. 4 Ac. (0.04) | --- |
| | | | | | Woods (Crystal) Creek Tributary Dyes Inlet (251) | | | | | | |
| 1306 | 1337 | 980* | 4-21-25 | Woods Creek | Silverdale Water District | 0.40 | 25/1E | SESE | 30 | Com. Dom. | --- |
| 1344 | 585 | 155* | 6-24-25 | Woods Creek | (b) (6) | 0.05 | 25/1E | Govt. Lot 4 | 29 | Dom. | --- |
| 3806 | 2028 | 1435 | 4-7-33 | Woods Creek | | 0.01 | 25/1E | Govt. Lot 4 | 29 | Dom. | --- |
| 3816 | 2349 | 980* | 4-26-33 | Woods Creek | Silverdale Water District | 0.10 | 25/1E | SESE | 30 | Com. Dom. | --- |
| 13084 | 9879 | 7939 | 6-24-54 | Woods Creek | Silverdale Water District | 0.56 | 25/1E | NESE | 30 | Com. Dom. | S, A |
| 15376 | 11668 | | 4-6-59 | Unnamed stream | (b) (6) | 0.11 | 25/1E | SESE | 30 | Com. Dom. | --- |
| 16312 | 12278 | | 8-31-60 | Woods Creek & unnamed pond | Buchanan Lumber Co. | 0.50 | 25/1E | SENE<br>NESE | 30 | Gravel washing | S |
| 16313 | 12144 | | 8-31-60 | Woods Creek | (b) (6) | 0.02 | 25/1E | Govt. Lot 4 | 29 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| 16361 | 12259 | | 9-30-60 | Woods Creek & unnamed stream | Silverdale Water Dist. No. 16 | 0.50 | 25/1E | NESE | 30 | Com. Dom. | A |
| | | | | | Unnamed Stream Tributary Dyes Inlet (252) | | | | | | |
| 1748 | 951 | 274 | 6-9-26 | Unnamed stream(northerly branch) | (b) (6) | 0.02 | 25/1E | NE¼ | 31 | Dom. | --- |
| 5213 | 3145 | 1596 | 7-27-40 | Unnamed stream(southerly branch) | Eldorado Water District | 0.10 | 25/1E | NENE | 31 | Com. Dom. | --- |
| 5214 | 3146 | 1833 | 7-27-40 | Unnamed stream(northerly branch) | Eldorado Water District | 0.05 | 25/1E | NENE | 31 | Com. Dom. | --- |
| 13979 | 10417 | | 7-23-56 | Unnamed stream(northerly branch) | (b) (6) | 0.11 | 25/1E | NENE | 31 | Com. Dom. | --- |
| 14906 | 12084 | 7716 | 7-14-58 | Unnamed stream (southerly branch) | Eldorado Water District | 0.20 | 25/1E | NENE | 31 | Com. Dom. | --- |
| | | | | | Unnamed Stream Tributary Dyes Inlet (255) | | | | | | |
| 3644 | 1915 | 814* | 5-26-32 | Unnamed stream | (b) (6) | 0.05 | 25/1E | SWSW | 32 | Group Dom. | --- |
| 4732 | 2699 | 1903 | 2-3-39 | Unnamed stream | | 0.03 | 25/1E | Govt. Lot 3 | 32 | Dom. (0.01) & Garden Irr. (0.02) | --- |
| 17028 | 12606 | | 11-20-61 | Unnamed stream | | 0.01 | 25/1E | NESE | 31 | Dom. | --- |
| 17029 | 12640 | | 11-20-61 | Unnamed stream | | 0.10 | 25/1E | NESE | 31 | Group Dom. | --- |

Unnamed Stream Tributary Chico Bay (257)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2691 | 1421 | 683 | 8-30-24 | Unnamed stream | (b) (6) [redacted] | 0.02 | 25/1E | Govt. Lot 4 | 32 | Dom. | --- |
| 4723 | 2689 | 1430 | 1-19-39 | Unnamed stream (northerly branch) | | 0.03 | 25/1E | SESE | 31 | Dom. (0.01) & Irr. 8 Ac. (0.02) | --- |
| 5324 | 3228 | 5398 | 1-7-41 | Unnamed stream (southerly branch) | | 0.05 | 25/1E | SESE | 31 | Dom. | --- |
| 8930 | 6205 | 4131 | 7-25-49 | Unnamed stream (north and south branches) | Randsville Water Users | 0.10 | 25/1E | Govt. Lot 4 | 32 | Dom. | --- |

Unnamed Stream Tributary Chico Bay (258)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6852 | 4696 | 3511 | 1-12-46 | Unnamed stream | Erland's Point Water Corp. | 0.25 | 24/1E | SENE | 6 | Com. Dom. | --- |
| 9818 | 7018 | 6429 | 8-9-50 | Unnamed stream | (b) (6) [redacted] | 0.10 | 24/1E | SWNW | 5 | Irr. 12 Ac. | S, D |
| 13012 | 9691 | 6324 | 7-9-54 | Unnamed spring | Central Kitsap School Dist. No. 401 | 0.01 | 24/1E | SWNW | 5 | School supply | --- |

Chico Creek Drainage (259)

Chico Creek Tributary Chico Bay

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4141 | 2244 | 1069* | 8-1-35 | Chico (Wildcat**) Creek | (b) (6) [redacted] | 0.26 | 24/1E | SWNE | 7 | Gravel Washing (0.25) & Dom. (0.01) | F |
| 4451 | 2513 | 2028 | 8-13-37 | Chico (Wildcat**) Creek | | 0.02 | 24/1E | NESE | 7 | Dom. (0.01) & Irr. 1 3/4 Ac. (0.01) | --- |
| 11651 | 8756 | 6437 | 9-4-52 | Chico (Wildcat**) Creek | | 0.022 | 24/1E | SENE | 7 | Dom. (0.01) & Fish Ponds (0.012) | S, D, B |
| 15923 | 11829 | | 3-1-60 | Chico Creek | | 0.07 | 24/1E | NWSE NESW | 7 | Dom. (0.01) & Irr. 6 Ac. (0.06) | S |

Kitsap Creek Drainage Tributary Chico Creek

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3447 | 1829 | 1265 | 7-13-31 | Canyon Creek | (b) (6) [redacted] | 0.08 | 24/1E | NWNW | 20 | Dom. (0.02) & Irr. 4 Ac. (0.06) | --- |
| 4762 | 2788 | 1417 | 3-23-39 | Unnamed creek | (b) (6) [redacted] | 0.01 | 24/1E | SWSE | 17 | Dom. | --- |
| 5383 | 3313 | 1735 | 3-13-41 | Kitsap Creek | | 0.005 | 24/1E | NWSW | 8 | Irr. Lawn | --- |
| 5469 | 3507 | 1976 | 5-22-41 | Canyon Creek | | 0.0066 | 24/1E | NWNW | 20 | Dom. | --- |
| 5469 | 3507 | 1977 | 5-22-41 | Canyon Creek | | 0.0066 | 24/1E | NWNW | 20 | Dom. | --- |
| 5469 | 3507 | 1978 | 5-22-41 | Canyon Creek | | 0.0066 | 24/1E | NWNW | 20 | Dom. | --- |
| 5685 | 3964 | 3041 | 4-21-42 | Kitsap Creek | | 0.01 | 24/1E | NWSW | 8 | Dom. & Stock | --- |
| 9163 | 6234 | 3658 | 10-19-49 | Canyon Creek | | 0.01 | 24/1E | NWNW | 20 | Dom. | S, D |
| 11799 | 8782 | 6294 | 10-28-52 | Unnamed stream | | 0.10 | 24/1E | SENW | 20 | Dom. (0.01) Stock & Irr. 10 Ac. (0.09) | S, D, F |
| 16831 | 12450 | 8279 | 8-3-61 | Kitsap Lake | | 0.01 | 24/1E | Govt. Lot 1 | 17 | Dom. | S |

Dickenson Creek Tributary Chico Creek

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 595 | 298 | 1181 | 2-9-21 | Dickenson Creek | (b) (6) [redacted] | 0.01 | 24/1E | SE¼ | 7 | Dom. & Irr. 1 Ac. | --- |
| 2283 | 1136 | 426 | 4-18-28 | Dickenson Creek | | 0.16 | 24/1E | SWNW | 8 | Irr. 6 Ac. | --- |
| 2267 | 1405 | 486 | 8-10-29 | Dickenson Creek | Kitsap Lake Development Assoc. | 0.35 | 24/1E | SENW | 18 | Com. Dom. | --- |
| 3562 | 1831 | 603 | 11-24-31 | Dickenson Creek | (b) (6) [redacted] | 0.01 | 24/1E | NESE | 7 | Dom. | --- |
| 4093 | 2427 | 1549 | 4-4-35 | Dickenson Creek | | 0.02 | 24/1E | NWSW | 8 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| 4112 | 2209 | 957 | 5-18-35 | E. Fork Dickenson Creek | Kitsap Lake Development Assoc. | 0.35 | 24/1E | SENW | 18 | Com. Dom. | A |
| 5540 | 3437 | 2101 | 8-4-41 | Dickenson Creek | (b) (6) [redacted] | 0.01 | 24/1E | NESE | 7 | Dom. | --- |
| 5550 | 3433 | 1983 | 8-9-41 | Dickenson Creek | | 0.01 | 24/1E | NESE | 7 | Dom. | --- |
| 5691 | 3649 | 2504 | 4-30-42 | Dickenson Creek | | 0.01 | 24/1E | SWNW | 8 | Dom. | --- |
| 5910 | 3785 | 2035 | 10-9-43 | Dickenson Creek | | 0.01 | 24/1E | NESE | 7 | Dom. | --- |
| 6785 | 4380 | 2841 | 11-28-45 | Unnamed spring | | 0.01 | 24/1E | SESE | 7 | Dom. | --- |
| 6786 | 4381 | 2842* | 11-28-45 | Dickenson Creek | | 0.01 | 24/1E | SESE | 7 | Group Dom. | --- |

Unnamed Brook Tributary Chico Creek

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16341 | 12136 | 8058 | 9-20-60 | Unnamed brook | The Mountaineers, Inc. | 0.25 | 24/1E | SWNW | 7 | Dom. (0.05) & Ram Operation (0.20) | S |

* Certificate in error, change required.
** Indicates stream named on certificate although diversion is actually on indicated stream.

## KITSAP PENINSULA

### Wildcat Creek Tributary Chico Creek

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6490 | 4209 | 2607 | 6-19-45 | Unnamed stream | (b) (6) | 0.20 | 24/1W | SESW | 2 | Dom. (0.01), Power (0.17) & Irr. 2 Ac. (0.02) | S |
| 16102 | 12114 | 8349 | 6-7-60 | Unnamed spring | | 0.01 | 24/1E | SWNW | 7 | Dom. | --- |
| 16544 | 12291 | | 2-21-61 | Unnamed creek | | 0.02 | 24/1W | SWSE | 2 | Dom. (0.01) & Irr. 1 Ac. (0.01) | S |
| 16545 | 12296 | 8363 | 2-21-61 | Unnamed creek | | 0.04 | 24/1W | SWSE | 2 | Dom. (0.02) & Irr. 2 Ac. (0.02) | S |
| 17127 | 12646 | | 2-7-62 | Unnamed creek | | 0.04 | 24/1W | SWSE | 2 | Irr. 3 Ac. (0.03) & Dom. (0.01) | S |

### Lost Creek Tributary Chico Creek

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | T. R. | Subdivision | Sec. | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15875 | | | 1-28-60 | Lost Creek | Kitsap County P.U.D. No. 1 | 20.00 | 24/1W | NESW | 12 | Municipal supply | --- |

### Unnamed Stream Tributary Ostrich Bay (263)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | T. R. | Subdivision | Sec. | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2182 | 1063 | 491 | 10-20-27 | Unnamed stream | (b) (6) | 0.10 | 24/1E | NESW | 16 | Dom. (0.01) & Game Farming (0.09) | --- |
| 5175 | 3132 | 1746 | 7-6-40 | Unnamed stream | Woodlawn Cemetery Inc. | 0.03 | 24/1E | SENW | 16 | Irr. 5 Ac. | --- |

### Wright Creek Tributary Sinclair Inlet (266)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | T. R. | Subdivision | Sec. | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 623 | 237 | 45 | 5-14-21 | Wright Creek | (b) (6) | 4.00 | 24/1E | SWNE | 28 | Power (3.99) & Dom. (0.01) | --- |

### Gorst Creek Tributary Sinclair Inlet (268)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | T. R. | Subdivision | Sec. | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 213 | 69 | 802 | 2-18-19 | Bailey's Creek & unnamed stream | (b) (6) | 0.10 | 24/1E | NWSE | 32 | Dom. (0.01), Power (0.03) & Irr. 5.5 Ac. (0.06) | --- |
| 5853 | 3726 | 1994 | 6-23-43 | Bailey's Creek | et al | 0.03 | 24/1E | NWSE | 32 | Dom. (0.03) & Irr. 3 Ac. | --- |
| 7656 | 5067 | 2893 | 3-4-47 | Parrish Creek | | 0.02 | 23/1E | NESE | 6 | Dom. (0.01) & Irr. 2 Ac. (0.01) | S |
| 7666 | 5057 | | 3-7-47 | Gorst Creek | | 0.02 | 24/1E | SWNE | 32 | Irr. 1.5 Ac. | S |
| 14831 | 12012 | 7765 | 5-26-58 | Parrish Creek & unnamed stream | | 0.07 | 23/1E | NWNE | 7 | Dom. (0.01), Stock (0.01) & Irr. 5 Ac. (0.05) | S |

### Unnamed Stream Tributary Sinclair Inlet (269)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | T. R. | Subdivision | Sec. | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3999 | 2147 | 928 | 7-11-34 | Unnamed stream | (b) (6) | 0.15 | 24/1E | SESE | 32 | Dom. (0.02), Power (0.05) & Irr. 8 Ac. (0.08) | --- |
| 4001 | 2148 | 826 | 7-12-34 | Unnamed stream | | 0.02 | 24/1E | SWSE | 32 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| 4797 | 2952 | 1797 | 4-26-39 | Unnamed stream | | 0.01 | 24/1E | Govt. Lot 2 | 32 | Dom. | --- |
| 5421 | 3379 | 1784 | 4-21-41 | Unnamed stream | (b) (6) et al | 0.03 | 24/1E | SWSE | 32 | Dom. | --- |
| 8486 | 5754 | 3226 | 6-19-48 | Unnamed stream | (b) (6) | 0.02 | 24/1E | SWSE | 32 | Irr. 2 Ac. | S |
| 17198 | 12710 | 8544 | 3-26-62 | Unnamed stream | | 0.02 | 24/1E | W½SE | 32 | Irr. 2 Ac. | S |

### Unnamed Stream Tributary Sinclair Inlet (270)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | T. R. | Subdivision | Sec. | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4768 | 2749 | 1238 | 3-29-39 | Unnamed stream | (b) (6) | 0.01 | 24/1E | SESE | 32 | Dom. & Irr. 1 Ac. | --- |

### Unnamed Stream Tributary Sinclair Inlet (273)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | T. R. | Subdivision | Sec. | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3748 | 2069 | 1071 | 11-22-32 | Unnamed stream | (b) (6) | 0.30 | 24/1E | Govt. Lot 3 | 33 | Dom. (0.01) & Irr. 20 Ac. (0.29) | --- |

### Ross Creek Tributary Sinclair Inlet (275)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | T. R. | Subdivision | Sec. | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5036 | 3104 | 5475 | 12-7-39 | Ross Creek | (b) (6) | 0.10 | 24/1E | SWSE | 34 | Dom. (0.01) & Irr. 7 Ac. (0.09) | --- |
| 5163 | 3087 | 1378 | 6-21-40 | Unnamed springs | | 0.10 | 24/1E | Govt. Lot 4 | 27 | Dom. (0.01), Power (0.06) & Irr. 4 Ac. (0.03) | --- |

### Unnamed Stream Tributary Sinclair Inlet (277)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6104 | 3950 | 2560 | 8-10-44 | Unnamed stream | (b) (6) [redacted] | 0.01 | 24/1E | NWNW | 35 | Dom. & Garden Irr. | --- |

### Blackjack Creek Drainage (279)

### Blackjack Creek Tributary Sinclair Inlet

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1651 | 926 | 205 | 3-20-26 | Blackjack Creek | (b) (6) [redacted] | 0.05 | 23/1E | SWNE | 14 | Dom. (0.01) & Irr. 8 Ac. (0.04) | --- |
| 6341 | 4112 | 2325 | 3-8-45 | Blackjack Creek | | 0.40 | 23/1E | NWSW | 11 | Irr. 40 Ac. | S |
| 6346 | 4111 | 2465 | 3-13-45 | Blackjack Creek | | 0.60 | 23/1E | NESW | 14 | Irr. 80 Ac. | S |
| 6417 | 4139 | 2724 | 5-9-45 | Blackjack Creek | | 0.40 | 23/1E | NWNW | 11 | Irr. 60 Ac. | S |
| 6433 | 4142 | 2326 | 5-15-45 | Blackjack Creek | | 0.12 | 23/1E | SESW | 11 | Dom. (0.01) & Irr. 15 Ac. (0.11) | S |
| 6481 | 4448 | 2536 | 6-11-45 | Blackjack Creek | | 0.15 | 23/1E | NESW | 11 | Irr. 15 Ac. | S |
| 7167 | 4798 | 3046 | 5-22-46 | Blackjack Creek | | 0.02 | 23/1E | SWNE | 2 | Irr. (0.01) & Dom. (0.01) | S, F |
| 7496 | 5023 | 4460 | 10-14-46 | Blackjack Creek | | 0.35 | 23/1E | NESW | 14 | Irr. 35 Ac. | S, F |
| 8846 | 6313 | 5361 | 6-16-49 | Unnamed spring & Blackjack Creek | | 0.10 | 24/1E | SENE | 35 | Dom. (0.01) & Irr. 10 Ac. (0.09) | S, D, F |
| 9002 | 6207 | 4846 | 8-15-49 | Blackjack Creek | | 0.11 | 23/1E | NENW | 14 | Irr. 11 Ac. | S, D, F |
| 9311 | 6444 | 4750 | 1-9-50 | Blackjack Creek | | 0.05 | 23/1E | NWNE | 14 | Irr. 5 Ac. | S, F |
| 10184 | 7246 | 4816 | 3-12-51 | Blackjack Creek | | 0.75 | 23/1E | NWSE | 14 | Irr. 80 Ac. | S, D, F |
| 14812 | 12001 | 7683 | 5-26-58 | Unnamed spring & Blackjack Creek | | 0.01 | 23/1E | NESW | 2 | Dom. | S, D |

### Tributaries Blackjack Creek

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3878 | 2137 | 997 | 8-25-33 | Unnamed stream | (b) (6) [redacted] | 0.02 | 23/1E | SWNW | 10 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| 5601 | 3491 | 2327 | 10-30-41 | Unnamed brooklet | | 0.01 | 23/1E | SWNW | 14 | Dom. | --- |
| 5906 | 3756 | 2058 | 9-28-43 | Unnamed stream | | 0.10 | 23/1E | NESE | 22 | Dom. (0.01), Stock, Power (ram) (0.08) & Irr. 1.5 Ac. (0.01) | --- |
| 6040 | 3879 | 2503 | 5-25-44 | Unnamed brook | | 0.13 | 23/1E | SENE | 22 | Dom. (0.01) & Irr. 13 Ac. (0.12) | S |
| 6277 | 4022 | 2475 | 12-29-44 | Unnamed spring | | 0.01 | 24/1E | SENE | 35 | Dom. | --- |
| 9343 | 6528 | | 1-25-50 | Berry Lake | | 0.08 | 23/1E | SESE | 3 | Irr. 8 Ac. | S |
| 9862 | 6875 | 4172 | 8-28-50 | Berry Lake | | 0.04 | 23/1E | SESE | 3 | Irr. 4 Ac. | S |
| 10187 | 7305 | 5350 | 1-31-51 | Reservoir in unnamed stream | | 0.08 | 23/1E | NENW | 10 | Irr. 10 Ac. | S, F, D, C |
| 11908 | 8868 | 5664 | 12-19-52 | Unnamed spring | | 0.05 | 23/1E | SWSE | 22 | Stock (0.01) & Irr. 5 Ac. (0.04) | --- |
| 13570 | 10134 | 6689 | 8-25-55 | Unnamed springs | | 0.20 | 23/1E | SWNW | 23 | Dom. (0.01) & Irr. 20 Ac. (0.19) | S |
| 15900 | 11773 | | 2-16-60 | Unnamed springs | | 0.17 | 23/1E | W½NW | 14 | Dom. (0.01), Stock (0.01), Fish (0.05) & Irr. 10 Ac. (0.10) | --- |
| 16085 | 11873 | | 5-25-60 | Unnamed creek | | 0.07 | 23/1E | SENE | 2 | Irr. 7 Ac. | --- |

### Unnamed Stream Tributary Sinclair Inlet (280)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5218 | 3133 | 1510 | 8-1-40 | Unnamed stream | (b) (6) [redacted] | 0.02 | 24/1E | Govt. Lot 1 | 25 | Irr. 1.5 Ac. | --- |
| 5318 | 3239 | 1579 | 12-20-40 | Unnamed stream | [redacted]torage Coop. | 0.03 | 24/1E | SWSW | 25 | Manufacturing (cooling) | --- |
| 8847 | 7514 | 4857 | 6-16-49 | Unnamed spring | (b) (6) [redacted] | 0.005 | 24/1E | SWNW | 36 | Dom. | --- |
| 11298 | 8443 | 5389 | 4-29-52 | Unnamed stream | | 0.01 | 24/1E | NWNW | 36 | Irr. 1 Ac. | --- |

### Unnamed Stream Tributary Port Orchard (281)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3236 | 1679 | 915 | 11-20-30 | Unnamed stream | (b) (6) [redacted] | 0.01 | 24/1E | NWNE | 36 | Dom. & Irr. 1 Ac. | --- |
| 17283 | 12782 | 8625 | 5-11-62 | Unnamed stream | South Kitsap School District No. 402 | 0.05 | 24/1E | SESW | 25 | Irr. 5 Ac. | S |

### Annapolis Creek Tributary Port Orchard (282)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3081 | 1627 | 684 | 8-12-30 | Annapolis Creek | Union High School Dist. No. 5 & Kitsap County | 0.25 | 24/1E | SWNE | 36 | Dom. supply for poor farm & high school | --- |

### Unnamed Stream Tributary Port Orchard (284)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9605 | 7039 | 7452 | 5-12-50 | Unnamed stream | (b) (6) [redacted] | 0.18 | 24/2E | SWNW | 30 | Dom. (0.01) & Fish Prop (0.17) | --- |

## KITSAP PENINSULA

### Sullivan Creek Tributary Port Orchard (285)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2402 | 1265 | 808 | 9-1-28 | Wilson Creek | [redacted] | 0.30 | 24/2E | SE¼ | 30 | Dom. (0.01) & Irr. 30 Ac. (0.29) | --- |
| 3369 | 1803 | 904 | 5-1-31 | Sullivan Creek | [redacted] | 0.05 | 24/2E | Govt. Lot 3 | 19 | Dom. (0.01) & Irr. 1 Ac. (0.04) | --- |
| 10585 | 7667 | 5591 | 8-7-51 | Unnamed stream | [redacted] | 0.01 | 24/2E | NWNW | 29 | Irr. 6 Ac. | S |
| 13116 | 9828 | 6218 | 9-8-54 | Sullivan Creek | [redacted] | 0.02 | 24/2E | NWNE | 30 | Irr. 2 Ac. | S, D |

### Unnamed Stream Tributary Port Orchard (287)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3465 | 1810 | 577 | 8-1-31 | Unnamed stream | [redacted] | 0.02 | 24/2E | Govt. Lot 1 | 17 | Dom., Fish Prop. & Irr. 1 Ac. | --- |

### Unnamed Stream Tributary Port Orchard (288)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2773 | 1413 | 797 | 12-3-29 | Unnamed stream | [redacted] | 0.05 | 24/2E | NENE | 17 | Dom. (0.01) & Irr. 2 Ac. (0.04) | --- |
| 5354 | 3413 | 2344 | 2-10-41 | Unnamed stream | [redacted] | 0.01 | 24/2E | Govt. Lot 2 | 8 | Dom. | --- |
| 13406 | 10105 | | 4-29-55 | Unnamed stream | [redacted] | 0.25 | 24/2E | SESE | 17 | Com. Dom. | S |
| 15619 | 11680 | | 8-7-59 | Unnamed stream | [redacted] | 0.06 | 24/2E | Govt. Lot 2 | 8 | Dom. (0.01) & Irr. 5 Ac. (0.05) | S, D |

### Beaver Creek Tributary Clam Bay (289)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1582 | 953 | 313 | 1-2-26 | Beaver Creek | [redacted] | 5.00 | 24/2E | NWSW | 16 | Power | --- |
| 2492 | 1260 | 329 | 1-16-29 | Beaver Creek | [redacted] | 0.14 | 24/2E | NWSW | 21 | Dom. (0.01) & Power (0.12) | --- |
| 5254 | 3185 | 2072 | 9-5-40 | Unnamed spring | [redacted] | 0.01 | 24/2E | NESW | 16 | Dom. | --- |
| 10103 | 7225 | 4250 | 2-3-51 | Beaver Creek | [redacted] | 0.01 | 24/2E | NESW | 16 | Dom. | S, D |
| 10871 | 7837 | 7426 | 11-13-51 | Unnamed stream | [redacted] | 0.04 | 24/2E | SESE | 20 | Irr. 4 Ac. | S |
| 15537 | 11574 | | 6-24-59 | Unnamed pond | [redacted] | 0.06 | 24/2E | SWSW | 21 | Stock (0.01) & Irr. 5 Ac. (0.05) | S |

### Unnamed Spring Tributary Puget Sound

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3640 | 1909 | 630 | 5-21-32 | Unnamed spring | Puget Sound Navigation Co. | 0.04 | 24/2E | NWSW | 22 | Dom. | --- |

### Unnamed Spring Tributary Puget Sound

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1346 | 581 | 891 | 6-16-25 | Unnamed spring | [redacted] et al | 0.02 | 24/2E | Govt. Lot 3 | 22 | Dom. | --- |

### Duncan Creek Tributary Puget Sound (291)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5596 | 3456 | 1817 | 10-15-41 | Duncan Creek | [redacted] | 0.01 | 24/2E | Govt. Lot 3 | 22 | Dom. & Irr. 3/4 Ac. | --- |

### Unnamed Stream Tributary Yukon Harbor (292)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9123 | 6197 | 5239 | 9-29-49 | Unnamed stream | [redacted] | 0.03 | 24/2E | SESE | 28 | Irr. 3 Ac. | --- |

### Curley Creek Drainage (294)

### Curley Creek Tributary Yukon Harbor

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7689 | 5156 | 4348 | 3-17-47 | Curley Creek | [redacted] | 0.10 | 23/2E | SWNE | 8 | Irr. 10 Ac. | S |
| 10610 | 7868 | 5038 | 8-14-51 | Curley Creek | [redacted] | 0.10 | 23/2E | SWNE | 8 | Dom. (0.01) & Irr. 9 Ac. (0.09) | S, D |
| 14358 | 10934 | 7520 | 6-10-57 | Curley Creek | [redacted] et al | 0.07 | 23/2E | SWNE | 8 | Group Dom. (0.05) & Irr. 2 Ac. (0.02) | S, D |
| 15262 | 11334 | | 1-28-59 | Curley Creek | [redacted] | 0.20 | 23/2E | SESE | 5 | Irr. 20 Ac. | S, D |
| 15592 | 11579 | 8167 | 7-28-59 | Curley Creek | [redacted] | 0.04 | 23/2E | SWNE | 8 | Irr. 4 Ac. | S, D |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Unnamed Tributaries Curley Creek | | | | | |
| 5181 | 3281 | 1769 | 7-11-40 | Pond in unnamed creek | (b) (6) [redacted] | 0.05 | 24/2E | NWSE | 33 | Frog pond | D |
| 5899 | 3733 | | 9-11-43 | Unnamed springs | | 0.20 | 24/2E | NESW | 33 | Dom. (0.01), Power (0.04), Fish, Swimming (0.10) & Irr. 5 Ac. (0.05) | --- |
| 7699 | 5215 | 3359 | 3-19-47 | Pond in unnamed creek | | 0.05 | 23/2E | SENW | 4 | Dom. (0.01) & Irr. 5 Ac. (0.04) | S |
| 9925 | 7057 | 6088 | 9-28-50 | Unnamed creek | | 0.04 | 24/2E | NWSE | 33 | Irr. 4 Ac. | S, D |
| 10469 | 7553 | 8593 | 7-6-51 | Unnamed stream | | 0.05 | 23/2E | NESE | 5 | Irr. 10 Ac. | S |
| 11451 | 8431 | 5113 | 6-13-52 | Unnamed spring | | 0.01 | 23/2E | NWSW | 3 | Dom. | S |
| 11699 | 8565 | 5105 | 9-24-52 | Unnamed spring | | 0.01 | 23/2E | SWSW | 3 | Dom. | S, D |
| 12802 | 9708 | | 3-10-54 | Unnamed stream | | 0.10 | 23/2E | N½SE | 5 | Irr. 10 Ac. | F |
| | | | | | | Long Lake Tributary Curley Creek | | | | | |
| 9833 | 6907 | 5046 | 8-15-50 | Long Lake | (b) (6) [redacted] | 0.10 | 23/2E | Govt. Lot 4 | 17 | Irr. 10 Ac. | S |
| 10109 | 7178 | 4185 | 2-5-51 | Long Lake | | 0.05 | 23/2E | Govt. Lot 2 | 7 | Irr. 5 Ac. | S |
| 10589 | 7605 | 4419 | 8-8-51 | Long Lake | | 0.01 | 23/2E | Govt. Lot 2 | 17 | Dom. | S |
| 11550 | 8423 | 6300 | 7-25-52 | Long Lake | | 0.04 | 23/2E | Govt. Lot 2 | 17 | Irr. 4 Ac. | S |
| 11642 | 8489 | | 9-2-52 | Long Lake | | 0.15 | 23/2E | Govt. Lot 2 | 7 | Irr. 15 Ac. | S |
| 11648 | 8461 | 5371 | 9-3-52 | Long Lake | | 0.02 | 23/2E | Govt. Lot 2 | 7 | Dom. (0.01) & Irr. 1 Ac. (0.01) | S |
| | | | | | | Unnamed Tributaries Long Lake | | | | | |
| 6148 | 3991 | 2224 | 9-14-44 | Unnamed brooklet | (b) (6) [redacted] | 0.01 | 23/2E | Govt. Lot 3 | 17 | Dom. & Irr. 1 Ac. | --- |
| 7754 | 5264 | | 4-12-47 | Unnamed stream | | 0.02 | 23/2E | Govt. Lot 1 | 20 | Dom. (0.01) & Irr. 2 Ac. (0.01) | S |
| 8753 | 5977 | 3657 | 4-12-49 | Unnamed spring | | 0.02 | 23/2E | NWNW | 8 | Dom. (0.01) & Irr. 2 Ac. (0.01) | S, D |
| 9832 | 6906 | 5045 | 8-15-50 | Unnamed brook | | 0.10 | 23/2E | NWNE | 17 | Irr. 10 Ac. | --- |
| 9940 | 7058 | 4166 | 10-13-50 | Unnamed brook | | 0.02 | 23/2E | NENW | 17 | Dom. | S, D |
| 10091 | 7172 | 4298 | 1-29-51 | Unnamed stream | | 0.03 | 23/2E | NWSE | 20 | Irr. 3 Ac. | S, D |
| 11863 | 8818 | 5717 | 11-20-52 | Unnamed stream | | 0.03 | 23/2E | SENE | 20 | Irr. 3 Ac. | S, D |
| 12659 | 9434 | 5774 | 11-17-53 | Unnamed spring | | 0.01 | 23/2E | N½NW | 17 | Dom. | S, D |
| 16261 | 11956 | 8276 | 8-11-61 | Unnamed creek | | 0.11 | 23/2E | SWNE | 18 | Dom. (0.01), Beautification & Fish Prop. (0.10) | S, D, B |
| | | | | | | Salmonberry Creek Tributary Long Lake | | | | | |
| 6420 | 4188 | 2497 | 5-9-45 | Salmonberry Creek & unnamed brook | (b) (6) [redacted] | 0.44 | 23/2E | W½NE & E½NW | 7 | Irr. 120 Ac. | S, C |
| 7234 | 4924 | 5600 | 6-11-46 | Salmonberry Creek | | 0.20 | 24/2E | SWSW | 32 | Irr. 20 Ac. | S, F |
| 10321 | 8300 | 5479 | 5-9-51 | Salmonberry Creek | | 0.08 | 24/2E | NWNE | 32 | Irr. 10 Ac. | S, D |
| | | | | | | Unnamed Tributaries Salmonberry Creek | | | | | |
| 5282 | 3215 | 1551 | 10-14-40 | Unnamed brook | (b) (6) [redacted] | 0.02 | 23/1E | SWSE | 12 | Dom. (0.01) & Garden Irr. (0.01) | --- |
| 12585 | 9399 | | 7-21-53 | Unnamed springs | | 0.60 | 23/2E | SESW NENW | 7 18 | Dom. (0.01) & Fish Prop. (0.59) | S |
| 15355 | 11340 | | 3-24-59 | Unnamed spring | | 0.05 | 23/2E | SESW | 7 | Dom. (0.01) & Power (0.04) | S |
| | | | | | | Unnamed Stream Tributary Yukon Harbor (295) | | | | | |
| 7495 | 4847 | 2689 | 10-10-46 | Unnamed stream | (b) (6) [redacted] | 0.15 | 24/2E | *Govt. Lot 3 | 34 | Beautification, Fire Prot (0.12) & Irr. 3 Ac. (0.03) | S |
| 12468 | 9417 | 6418 | 7-28-53 | Unnamed stream | | 0.02 | 23/2E | NWNW | 3 | Mill Use | --- |

* Certificate in error, change required.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Wilson Creek Tributary Yukon Harbor (297) | | | | | | |
| 2205 | 1060 | 303 | 11-28-27 | Wilson Creek | (b) (6) [redacted] | 0.01 | 23/2E | SENW | 3 | Dom. & Irr. 3 Ac. | --- |
| 11524 | 8612 | 5630 | 7-16-52 | Wilson Creek | | 0.05 | 24/2E | Govt. Lot 4 | 34 | Fish Prop. (0.04) & Irr. 1 Ac. (0.01) | --- |
| 11731 | 8535 | 5650 | 10-3-52 | Wilson Creek | | 0.02 | 23/2E | SENW | 3 | Dom. (0.01) & Irr. 3 Ac. (0.01) | --- |
| 14453 | 10839 | 7108 | 8-21-57 | Unnamed spring | | 0.01 | 23/2E | NWNE | 3 | Dom. | --- |
| 17292 | 12772 | | 5-18-62 | Unnamed stream & springs | | 0.06 | 23/2E | NWNW | 10 | Dom. (0.01) & Irr. 5 Ac. (0.05) | S |
| | | | | | Unnamed Stream Tributary Yukon Harbor (298) | | | | | | |
| 5455 | 3405 | 1793 | 5-10-41 | Unnamed stream | (b) (6) [redacted] | 0.04 | 24/2E | Govt. Lot 4 | 34 | Dom. (0.01), Power (0.03) & Irr. 3 Ac. | --- |
| | | | | | Unnamed Spring Tributary Puget Sound | | | | | | |
| 10717 | 7690 | 5728 | 9-11-51 | Unnamed spring | (b) (6) [redacted] | 0.005 | 24/2E | Govt. Lot 1 | 35 | Dom. | S, F |
| | | | | | Unnamed Spring Tributary Puget Sound | | | | | | |
| 10543 | 7620 | 4616 | 7-30-51 | Unnamed spring | (b) (6) [redacted] | 0.01 | 24/2E | Govt. Lot 1 | 35 | Irr. 1 Ac. | S, D |
| | | | | | Unnamed Stream Tributary Puget Sound (299) | | | | | | |
| 10472 | 7554 | | 7-9-51 | Unnamed stream | (b) (6) [redacted] | 0.01 | 24/2E | Govt. Lot 1 | 35 | Dom. | S, D |
| 14308 | 10836 | 7082 | 4-29-57 | Unnamed spring | | 0.02 | 24/2E | Govt. Lot 1 | 35 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| | | | | | Unnamed Stream Tributary Puget Sound (302) | | | | | | |
| 15623 | 11605 | 7799 | 8-11-59 | Two unnamed streams | (b) (6) [redacted] | 0.01 | 23/2E | SENW | 2 | Dom. | S |
| 16239 | 11955 | | 8-4-60 | Unnamed springs | | 0.06 | 23/2E | SWSE | 2 | Dom. (0.01) & Irr. (0.05) | S |
| | | | | | Unnamed Spring Tributary Colvos Passage (304) | | | | | | |
| 16227 | 11933 | 7969 | 8-2-60 | Unnamed spring | (b) (6) [redacted] | 0.005 | 23/2E | SWNE & Govt. Lot 3 | 11 | Dom. | S |
| 8365 | 5715 | 4524 | 4-30-48 | Unnamed spring | | 0.005 | 23/2E | SWNE | 11 | Dom. & Stock | --- |
| | | | | | Wilson Creek Tributary Colvos Passage (305) | | | | | | |
| 7851 | 5270 | 3789 | 5-28-47 | Unnamed stream | (b) (6) [redacted] | 0.20 | 23/2E | SENE | 15 | Fish Ponds | S |
| 16847 | 12442 | | 8-15-61 | Unnamed stream | | 0.01 | 23/2E | Govt. Lot 4 | 14 | Dom. | S |
| 17268 | 12779 | | 5-4-62 | Unnamed stream | | 0.06 | 23/2E | NWSE | 10 | Irr. 5 Ac. (0.05) & Dom. (0.01) | --- |
| | | | | | Unnamed Stream Tributary Colvos Passage (306) | | | | | | |
| 9801 | 7016 | 6121 | 7-31-50 | Unnamed spring | (b) (6) [redacted] | 0.01 | 23/2E | SESE | 15 | Dom. | S |
| | | | | | Unnamed Stream Tributary Colvos Passage (307) | | | | | | |
| 15733 | 11639 | 8011 | 10-23-59 | Unnamed spring | (b) (6) [redacted] | 0.01 | 23/2E | SWSE | 15 | Dom. | --- |

Big Phinney (Fragaria) Creek Tributary Colvos Passage (308)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4747 | 2766 | 1864 | 2-24-39 | Big Phinney (Fragaria) Creek | (b) (6) [redacted] | 0.03 | 23/2E | NENE | 28 | Dom. (0.01) & Irr. 1 Ac. (0.02) | S |
| 6445 | 4151 | 2319 | 5-21-45 | Unnamed stream | | 0.01 | 23/2E | SESW | 22 | Dom. | S |
| 6655 | 4351 | 2953 | 9-8-45 | Big Phinney (Fragaria) Creek | | 0.02 | 23/2E | NWNW | 27 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| 13131 | 9854 | 7090 | 9-17-54 | Three springs | | 0.01 | 23/2E | SESW | 22 | Dom. | S, D |
| 13197 | 9915 | 6172 | 11-24-54 | Big Phinney (Fragaria) Creek | | 0.20 | 23/2E | NENE | 28 | Dom. (0.01) & Swimming (0.19) | --- |
| 16942 | | | 9-29-61 | Little Phinney Creek | | 0.11 | 23/2E | SWNW | 22 | Irr. 10 Ac. (0.10) & Dom. (0.01) | S |
| 16956 | | | 10-9-61 | Little Phinney Creek | | 0.03 | 23/2E | NWSW | 22 | Irr. 2 Ac. (0.02) & Dom. (0.01) | S |
| 17063 | | | 12-18-61 | Little Phinney Creek | | 0.08 | 23/2E | SWSW | 22 | Dom. (0.01), Stock (0.01) & Power (0.06) | S |

Unnamed Stream Tributary Colvos Passage (310)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13730 | 10374 | 7672 | 2-2-56 | Unnamed spring & two unnamed streams | (b) (6) [redacted] | 0.02 | 23/2E | Govt. Lots 2 & 3 | 27 | Dom. | --- |
| 13789 | 10376 | 7884 | 4-2-56 | Unnamed stream | | 0.01 | 23/2E | Govt. Lot 2 | 27 | Dom. | --- |
| 13790 | 10377 | 7623 | 4-2-56 | Unnamed stream | | 0.01 | 23/2E | Govt. Lot 2 | 27 | Dom. | --- |

Unnamed Spring Tributary Colvos Passage (311)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15735 | 11865 | | 10-26-59 | Three unnamed springs | Olympic Homes Company | 0.50 | 23/2E | Govt. Lots 3 & 4, SWNW | 34 | Com. Dom. | S |

Olalla Creek Drainage (313)

Olalla Creek Tributary Olalla Bay

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3113 | 1601 | 1124 | 8-26-30 | Olalla Creek | (b) (6) [redacted] | 0.15 | 23/2E | SWNE | 29 | Irr. 13 Ac. | --- |
| 9585 | 6984 | 4492 | 5-5-50 | Olalla Creek | | 0.05 | 23/2E | NWSE | 32 | Irr. 5 Ac. | S, D |
| 9588 | 6914 | 5226 | 5-5-50 | Olalla Creek | | 0.10 | 23/2E | NWSE | 32 | Irr. 14 Ac. | S, D |
| 10803 | 7751 | 6046 | 10-15-51 | Olalla Creek | | 0.05 | 23/2E | NENE | 29 | Irr. 5 Ac. | S, D |
| 11650 | 8491 | 5971 | 9-4-52 | Olalla Creek | | 0.04 | 22/2E | NWNE | 5 | Dom. (0.01) & Irr. 6 Ac. (0.03) | S, D |
| 15028 | 11164 | | 8-28-58 | Olalla Creek | | 0.03 | 23/2E | SWSE | 32 | Irr. 3 Ac. | S, D |

Unnamed Tributaries Olalla Creek

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6202 | 4011 | 2453 | 10-17-44 | Unnamed creek | (b) (6) [redacted] | 0.05 | 23/2E | SESE | 32 | Dom. (0.01) & Irr. 4 Ac. (0.04) | S |
| 9586 | 6985 | 4510 | 5-5-50 | Unnamed brooklet | | 0.03 | 23/2E | NWSE | 32 | Irr. 3 Ac. | S |
| 9587 | 6913 | 5225 | 5-5-50 | Unnamed brooklet | | 0.03 | 23/2E | NWSE | 32 | Irr. 3 Ac. | S |
| 10697 | 7685 | 5810 | 9-5-51 | Unnamed lake | | 0.11 | 23/2E | NWNE | 33 | Stock (0.01) & Irr. 10 Ac. (0.10) | S |
| 12698 | 9503 | 7990 | 12-22-53 | Pond & unnamed spring | | 0.03 | 23/2E | NESW SENW | 33 | Irr. 2.5 Ac. | --- |
| 13439 | 10137 | 7345 | 5-23-55 | Unnamed stream | | 0.10 | 23/2E | NENW | 33 | Irr. 10 Ac. | S |
| 14568 | 10936 | 7466 | 10-31-57 | Unnamed brook | | 0.02 | 23/2E | NWSE | 32 | Dom. | S |
| 15253 | 11333 | 7660 | 1-22-59 | Pond & unnamed springs | | 0.02 | 22/2E | NENW | 5 | Irr. 2 Ac. | --- |
| 16111 | 11912 | | 6-8-60 | Unnamed stream | | 0.10 | 23/2E | W½SE | 28 | Irr. 10 Ac. | --- |
| 17282 | 12781 | | 5-11-62 | Unnamed lake | | 0.15 | 23/2E | NWNE | 33 | Irr. 15 Ac. | S |

Unnamed Spring Tributary Colvos Passage

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12541 | 9292 | 6349 | 8-31-53 | Unnamed spring | (b) (6) [redacted] | 0.01 | 22/2E | Govt. Lot 1 | 10 | Dom. | --- |

Unnamed Spring Tributary Colvos Passage

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8585 | 5965 | 3368 | 9-16-48 | Unnamed spring | (b) (6) [redacted] | 0.01 | 21/2E | Govt. Lot 1 | 4 | Dom. | --- |

Unnamed Stream Tributary Colvos Passage (320)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5616 | 3466 | | 11-27-41 | Unnamed stream | (b) (6) [redacted] | 0.05 | 21/2E | Govt. Lot 1 | 4 | Group Dom. | --- |

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Unnamed Spring Tributary Gig Harbor | | | | | | |
| 9562 | 7010 | 4614 | 4-27-50 | Unnamed spring | (b) (6) [redacted] | 0.025 | 21/2E | Govt. Lot 4 | 5 | Com. Dom. | --- |
| | | | | | Crescent Creek Tributary Gig Harbor (321) | | | | | | |
| 10268 | 7415 | 6150 | 4-26-51 | Crescent Creek | (b) (6) [redacted] | 0.05 | 22/2E | SWNE | 20 | Dom. (0.01) & Irr. (0.04) | S |
| 11086 | 8173 | 6263 | 2-20-52 | Unnamed stream | | 0.03 | 22/2E | SWSE | 32 | Irr. 3 Ac. | S |
| 13606 | 10253 | 7858 | 9-23-55 | Crescent Creek & unnamed springs | | 0.17 | 22/2E | E½NW | 29 | Dom. (0.01) & Irr. 16 Ac. (0.16) | S, D |
| 15050 | 11182 | | 9-3-58 | Crescent Creek | | 0.10 | 22/2E | NWSE | 29 | Dom. (0.01) & Irr. 10 Ac. (0.09) | S, D |
| 15511 | 11561 | | 6-9-59 | Unnamed spring | Gig Harbor Cemetery Association | 0.02 | 22/2E | E½ | 32 | Irr. 2 Ac. | S, D |
| | | | | | North Creek Tributary Gig Harbor (322) | | | | | | |
| 5752 | 3632 | 2567 | 10-22-42 | North Creek | (b) (6) [redacted] | 0.03 | 21/2E | NENW | 6 | Dom. (0.01) & Irr. 3 Ac. (0.02) | --- |
| 16469 | 12244 | | 12-19-60 | North Creek | | 0.10 | 22/2E | Govt. Lot 4 | 31 | Gravel Washing | S |
| | | | | | Unnamed Spring Tributary Gig Harbor | | | | | | |
| 13983 | 10444 | 7011 | 7-24-56 | Unnamed spring | (b) (6) [redacted] | 0.02 | 21/2E | NENE | 7 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Gig Harbor (323) | | | | | | |
| 10481 | 7602 | 4675 | 7-10-51 | Unnamed stream | (b) (6) [redacted] | 0.01 | 21/2E | SWNW | 8 | Irr. 0.5 Ac. | S, D |
| | | | | | Unnamed Spring Tributary The Narrows | | | | | | |
| 3272 | 1691 | 519 | 1-6-31 | Unnamed spring | Shore Acres Water District | 0.15 | 21/2E | Govt. Lots 1 & 2 | 7 | Com. Dom. | --- |
| | | | | | Sullivan Creek Tributary Wollochet Bay (327) | | | | | | |
| 4906 | 2838 | 1902 | 7-18-39 | Unnamed stream | (b) (6) [redacted] | 0.02 | 21/2E | SWNW | 29 | Ponds, Landscaping, & Beautification | --- |
| | | | | | Unnamed Spring Tributary Wollochet Bay | | | | | | |
| 3034 | 1545 | 476 | 7-3-30 | Unnamed spring | (b) (6) [redacted] | 0.005 | 21/2E | Govt. Lot 7 | 30 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Wollochet Bay (329) | | | | | | |
| 17082 | 12911 | | 12-26-61 | Unnamed stream & four springs | (b) (6) [redacted] et al | 0.21 | 21/1E | E½NE | 13 | Dom. (0.01), Stock & Irr. 30 Ac. (0.20) | S |
| | | | | | Artondale Creek Tributary Wollochet Bay (330) | | | | | | |
| 13461 | 10129 | 7946 | 6-8-55 | Unnamed spring | (b) (6) [redacted] | 0.04 | 21/1E | NESW | 13 | Irr. 4 Ac. | --- |
| 14787 | 11105 | | 5-7-58 | Artondale Creek | Artondale Golf & County Club | 0.35 | 21/1E | SWSW | 13 | Irr. 35 Ac. | S, D |
| | | | | | Unnamed Spring Tributary Wollochet Bay (331) | | | | | | |
| 15283 | 11298 | 8438 | 2-11-59 | Unnamed spring | (b) (6) [redacted] | 0.08 | 21/1E | SWNE | 24 | Dom. (0.01) & Irr. 7 Ac. (0.07) | S |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Unnamed Stream Tributary Wollochet Bay (332)** | | | | | | |
| 9864 | 6839 | 5968 | 8-30-50 | Unnamed stream | (b) (6) | 0.15 | 21/1E | SESE | 24 | Dom. (0.01) Fish, & Irr. 15 Ac. (0.14) | --- |
| 15468 | 11524 | 8343 | 5-18-59 | Unnamed spring, pond | | 0.07 | 21/1E | NESE | 25 | Fire Prot., Fish Prop. & Irr. 7 Ac. | --- |
| | | | | | **Unnamed Stream Tributary Hales Passage (336)** | | | | | | |
| 6067 | 3865 | 2892 | 6-27-44 | Unnamed stream | (b) (6) | 0.05 | 21/1E | NESW | 25 | Dom. (0.01) & Irr. 6 Ac. (0.04) | --- |
| | | | | | **Muri Creek Tributary Sunny Bay (337)** | | | | | | |
| 6046 | 3882 | 2333 | 6-1-44 | Muri Creek | (b) (6) | 0.03 | 21/1E | SWNW | 25 | Dom. (0.01) & Irr. 3½ Ac. (0.02) | --- |
| 9616 | 7377 | 4860 | 5-17-50 | Unnamed spring | | 0.005 | 21/1E | Govt. Lot 1 | 25 | Dom. | --- |
| | | | | | **Unnamed Stream Tributary Hales Passage (338)** | | | | | | |
| 5818 | 3846 | 2095 | 4-20-43 | Unnamed stream | (b) (6) | 0.01 | 21/1E | Govt. Lot 3 | 26 | Dom. | --- |
| | | | | | **Unnamed Spring Tributary Horsehead Bay** | | | | | | |
| 4515 | 2554 | 1104 | 3-31-38 | Unnamed spring | (b) (6) | 0.02 | 21/1E | Govt. Lot 2 | 28 | Stock (0.01) & Dom. (0.01) | --- |
| | | | | | **Unnamed Spring Tributary Horsehead Bay** | | | | | | |
| 3445 | 1865 | 1045 | 7-9-31 | Unnamed spring | (b) (6) | 0.01 | 21/1E | NWSE | 16 | Dom. | --- |
| | | | | | **Unnamed Stream Tributary Lay Inlet (342)** | | | | | | |
| 11715 | 8509 | | 9-29-52 | Unnamed stream | (b) (6) | 0.20 | 21/1E | W½SE | 15 | Irr. 20 Ac. | --- |
| 12035 | 8676 | 6494 | 2-4-53 | Unnamed stream | | 0.16 | 21/1E | N½SW | 11 | Irr. 30 Ac. | --- |
| 12072 | 9001 | 5844 | 2-16-53 | Unnamed stream | | 0.20 | 21/1E | NESWSE NWSWNE | 15 | Irr. 20 Ac. | S, F |
| 14057 | 10462 | 6725 | 8-29-56 | Unnamed spring | | 0.01 | 21/1E | SWSW | 15 | Dom. & Stock Water | --- |
| 14886 | 12058 | | 7-1-58 | Unnamed springs | | 0.20 | 21/1E | NWNW | 22 | Irr. 20 Ac. | S |
| 15306 | 11324 | 7523 | 2-20-59 | Unnamed spring | | 0.01 | 21/1E | SESE | 10 | Dom. | S |
| | | | | | **Meyer Creek Tributary Lay Inlet (343)** | | | | | | |
| 13449 | 10160 | 7086 | 5-31-55 | Meyer Creek | (b) (6) | 0.22 | 21/1E | SESW SWSW | 2 | Dom. (0.01), Stock (0.01) & Irr. 20 Ac. (0.20) | S, D, F |
| | | | | | **Unnamed Stream Tributary Lay Inlet (344)** | | | | | | |
| *6479 | 4208 | 3422 | 6-8-45 | Unnamed stream | (b) (6) | 0.15 | 21/1E | SWNE | 2 | Dom. (0.01), Stock, & Irr. 15 Ac. (0.14) | --- |
| 7873 | 5216 | 2913 | 6-10-47 | Unnamed stream | | 0.12 | 21/1E | NWNE | 2 | Irr. 12 Ac. | --- |
| | | | | | **Marble Creek Tributary Henderson Bay (349)** | | | | | | |
| 3590 | 1862 | 783 | 1-18-32 | Marble Creek | (b) (6) | 0.10 | 22/1E | Govt. Lot 3 | 26 | Dom. (0.01) & Fish Culture (0.09) | --- |
| | | | | | **Unnamed Spring Tributary Henderson Bay** | | | | | | |
| 9688 | 6867 | | 6-12-50 | Unnamed spring | (b) (6) | 0.01 | 22/1E | NESW | 25 | Dom. | S |

* Certificate in error, change required.





DNR-00005649

## KITSAP PENINSULA

### McCormick Creek Tributary Henderson Bay (350)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Location of Point of Diversion Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5530 | 3410 | 2170 | 7-29-41 | Unnamed stream | [redacted] | 0.01 | 22/1E | W½SE | 25 | Dom. | --- |
| 7550 | 5440 | | 11-25-46 | Unnamed stream | [redacted] | 0.11 | 22/1E | SESE | 25 | Dom. (0.01) & Fish Prop. (0.10) | S |
| 9511 | 6844 | 4422 | 4-8-50 | Unnamed spring | [redacted] | 0.10 | 22/1E | Govt. Lot 2 | 25 | Com. Dom. | --- |
| 14690 | 11202 | 8079 | 3-4-58 | McCormick Creek | Wynwood Garden Center, Inc. | 0.04 | 22/1E | SWSE | 25 | Nursery supply & Irr. 3 Ac. | S, D |
| 14876 | 12046 | 8657 | 6-24-58 | Unnamed springs & McCormick Creek | [redacted] | 0.50 | 21/1E | NWNE | 1 | Dom. (0.01) & Irr. 49 Ac. (0.49) | S, D |

### Unnamed Stream Tributary Burley Lagoon (353)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Location of Point of Diversion Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15403 | 11444 | 7614 | 3-11-59 | Unnamed stream | Peninsula School District | 0.02 | 22/1E | NENW | 24 | Irr. 2 Ac. | --- |

### Purdy Creek Tributary Burley Lagoon (354)

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Location of Point of Diversion Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2291 | 1245 | 2311 | 5-3-28 | Purdy Creek | [redacted] | 0.02 | 22/1E | NESW | 13 | Dom. (0.01), Stock, & Irr. (0.01) | --- |
| 6043 | 3881 | 2185 | 5-27-44 | Unnamed stream | [redacted] | 0.015 | 22/2E | NWSW | 7 | Dom. (0.01) & Irr. 1 Ac. (0.005) | --- |
| 6068 | 3874 | 2398 | 6-28-44 | Purdy Creek | [redacted] | 0.05 | 22/1E | SESE | 12 | Dom. (0.01) & Irr. 5 Ac. (0.04) | L |
| 9969 | 7059 | 4606 | 10-30-50 | Unnamed stream | [redacted] | 0.01 | 22/1E | SESE | 12 | Dom. | S, D |
| 11515 | 8436 | 5592 | 7-14-52 | Unnamed spring | [redacted] | 0.25 | 22/1E | SENE | 13 | Fish | S, D, F |
| 15632 | 11738 | | 8-14-59 | Purdy Creek | [redacted] | 0.18 | 22/2E | NENW | 6 | Irr. 18 Ac. | S, D |

### Burley Creek Drainage (356)

#### Burley Creek Tributary Burley Lagoon

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Location of Point of Diversion Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5293 | 3214 | 1883 | 10-30-40 | Burley Creek | [redacted] | 0.50 | 23/1E | W½NW | 36 | Cooling milk (0.10) & Irr. 40 Ac. (0.40) | S |
| 6116 | 3937 | 2364 | 8-21-44 | Burley Creek | [redacted] | 0.01 | 23/1E | SWNW | 25 | Irr. 1 Ac. | S |
| 6329 | 4061 | 4659 | 2-27-45 | Burley Creek | [redacted] | 0.01 | 23/1E | E½NE | 26 | Dom. & Garden Irr. | --- |
| 6348 | 4107 | 2519 | 3-14-45 | Burley Creek | [redacted] | 0.18 | 22/1E | NWNW | 12 | Irr. 18 Ac. | S |
| 6371 | 4109 | 3668 | 4-3-45 | Burley Creek | [redacted] | 0.25 | 23/1E | N½NW | 36 | Irr. 25 Ac. | S |
| 6375 | 4104 | 2449 | 4-7-45 | Burley Creek | [redacted] | 0.56 | 23/1E | SWSW | 25 | Irr. 104 Ac. | S |
| 7481 | 5018 | 2795 | 10-1-46 | Burley Creek | [redacted] | 0.03 | 23/1E | SWNW | 25 | Irr. 3 Ac. | S |
| 8525 | 5830 | 3700 | 7-26-48 | Burley Creek | [redacted] | 0.02 | 22/1E | NWNW | 12 | Irr. 2 Ac. | S |
| 16217 | 12677 | | 7-27-60 | Burley Creek | [redacted] | 0.09 | 23/1E | SWSE | 13 | Dom. (0.01) & Fish Prop. (0.08) | --- |

#### Bear Creek Tributary Burley Creek

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Location of Point of Diversion Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2196 | 1161 | 1475 | 11-1-27 | Bear Creek | [redacted] | 0.05 | 22/1E | SESE | 2 | Dom. (0.01) & Irr. 4 Ac. (0.04) | --- |
| 9870 | 9152 | 7953 | 9-5-50 | Unnamed stream | [redacted] | 0.35 | 22/1E | NWSW | 2 | Irr. 35 Ac. | S, D |
| 9881 | 6885 | 5506 | 9-11-50 | Unnamed brook | [redacted] | 0.15 | 22/1E | NESE | 3 | Irr. 15 Ac. | S |
| 16519 | 12600 | | 2-7-61 | Unnamed brook | [redacted] | 0.01 | 22/1E | NESE | 3 | Dom. | --- |

#### Various Tributaries Burley Creek

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | (T. R. | Location of Point of Diversion Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4004 | 2154 | 1117 | 7-17-34 | Unnamed creek | [redacted] | 0.41 | 22/1E | NESW | 1 | Dom. (0.01), Irr. 5 Ac. (0.10) & Power (0.30) | --- |
| 4005 | 2157 | 1043 | 7-18-34 | Unnamed stream | [redacted] | 0.06 | 23/1E | NENE | 26 | Dom. (0.01) & Power (0.05) | --- |
| 4555 | 2581 | 1121 | 7-8-38 | Unnamed spring | [redacted] | 0.02 | 22/1E | SWSE | 1 | Dom. | --- |
| 6372 | 4103 | 3650 | 4-3-45 | Unnamed brook | [redacted] | 0.25 | 23/1E | NENE | 35 | Irr. 25 Ac. | S |
| 8146 | 5505 | 3780 | 12-9-47 | Unnamed spring | [redacted] | 0.10 | 23/1E | NESE | 13 | Dom. (0.01) & Irr. 10 Ac. (0.09) | S, F |
| 8896 | 6126 | 4547 | 7-11-49 | Unnamed spring | [redacted] | 0.10 | 23/1E | NESE | 13 | Irr. 10 Ac. | S, D, F |
| 10102 | 7515 | 5809 | 2-2-51 | Unnamed springs | [redacted] | 0.10 | 23/1E | NESE | 13 | Dom. (0.01) & Irr. 10 Ac. (0.09) | S, D, F, A |

Unnamed Spring Tributary Burley Lagoon

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4907 | 2817 | 1865 | 7-20-39 | Unnamed spring | (b) (6) [redacted] | 0.03 | 22/1E | SENE | 11 | Dom. (0.02) & Garden Irr. (0.01) | --- |

Unnamed Stream Tributary Burley Inlet (357)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11719 | 8663 | 6431 | 9-30-52 | Unnamed stream | (b) (6) [redacted] | 0.02 | 22/1E | NWNE | 14 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |

Unnamed Stream Tributary Burley Lagoon (358)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10312 | 7435 | 4764 | 5-8-51 | Unnamed spring | (b) (6) [redacted] | 0.01 | 22/1E | Govt. Lot 2 | 14 | Dom. | --- |
| 16190 | 11941 | 7970 | 7-19-60 | Unnamed spring | | 0.01 | 22/1E | Govt. Lot 2 | 14 | Dom. | S |
| 16196 | 11952 | 8345 | 7-22-60 | Unnamed spring | | 0.01 | 22/1E | Govt. Lot 2 | 14 | Dom. | S |

Unnamed Stream Tributary Burley Lagoon (359)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16736 | 12418 | | 6-22-61 | Unnamed spring & stream | (b) (6) [redacted] | 0.04 | 22/1E | Govt. Lot 3 | 14 | Dom. (0.01) & Irr. 3 Ac. (0.03) | S |

Unnamed Stream Tributary Henderson Bay (362)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6165 | 3987 | 2252 | 9-22-44 | Unnamed spring | (b) (6) [redacted] | 0.10 | 22/1E | NWSW | 23 | Dom. (0.01) & Irr. 10 Ac. (0.09) | --- |
| Certificate of Change | | 339 | 1-2-52 | | | | | | | | |

Minter Creek Drainage (367)

Minter Creek Tributary Carr Inlet

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4731 | 2975 | 1331 | 1-28-39 | Minter Creek | State of Washington Dept. of Fisheries | 20.00 | 22/1E | SWSE | 20 | Fish culture, operation and scientific work on fish & operating downstream counting traps | --- |
| 7258 | 5012 | 3399 | 6-17-46 | Minter Creek | (b) (6) [redacted] | 0.10 | 22/1E | SWNE | 9 | Dom. (0.01) & Irr. 10 Ac. (0.09) | S |
| 12282 | 9071 | 5614 | 4-21-53 | Minter Creek | | 0.01 | 22/1E | NWNE | 9 | Dom. | S, D |

Tributaries of Minter Creek

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5652 | 3522 | 2613 | 2-28-42 | Lake Flora | (b) (6) [redacted] | 0.01 | 23/1E | SENE | 20 | Dom., Fire Prot., & Irr. 6 Ac. | S |
| 7901 | 5922 | 7717 | 6-21-47 | Unnamed stream | | 0.11 | 22/1E | NWSW | 15 | Dom. (0.01) & Irr. 6 Ac. (0.10) | --- |
| 7907 | 6155 | 3508 | 6-26-47 | Unnamed brook | State of Washington Dept. of Fisheries | 0.50 | 22/1E | NWNE | 29 | Dom. (0.02) & Fish Prop. (0.48) | S |
| 8532 | 11665 | 7841 | 7-30-48 | S. Fork Minter Creek | (b) (6) [redacted] | 0.19 | 22/1E | SESW | 15 | Dom. (0.01) & Irr. 15 Ac. (0.18) | S |
| 14398 | 10915 | 7150 | 7-9-57 | Unnamed creek | | 0.25 | 22/1E | NENE | 9 | Gravel Washing & Fish Prop. | S |
| 14838 | 11189 | 7439 | 6-2-58 | Unnamed spring | | 0.05 | 22/1E | SESW | 15 | Group Dom. | S |
| 15209 | 11704 | | 12-23-58 | S. Fork Minter Creek | Spadoni Brothers | 1.00 | 22/1E | NENW | 21 | Manufacturing (rock washing) | S, D, P |
| 15268 | 11677 | 7900 | 1-30-59 | S. Fork Minter Creek | (b) (6) [redacted] | 0.31 | 22/1E | SWSW | 15 | Dom. (0.01) & Irr. 30 Ac. (0.30) | S |

Unnamed Stream Tributary Carr Inlet (368)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6016 | 3872 | 2534 | 4-28-44 | Unnamed spring | (b) (6) [redacted] | 0.01 | 22/1E | NWSW | 29 | Dom. & Stock | --- |
| 17273 | 12770 | | 5-7-62 | Unnamed stream | | 0.25 | 21/1E | Govt. Lot 1 | 5 | Beautification, Aquatic Plant & Fish Prop. | S |

Lackey Creek Tributary Glen Cove (369)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3349 | 1782 | 1535 | 4-11-31 | Lackey Creek | (b) (6) [redacted] | 0.10 | 22/1E | SESW | 31 | Dom. (0.01) & Irr. 8 Ac. (0.09) | --- |

Unnamed Stream Tributary Von Geldern Cove (375)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3429 | 1771 | 1207 | 6-19-31 | Jackson's Lake | (b) (6) [redacted] | 0.03 | 21/1W | NENW | 26 | Dom. (0.01) & Irr. 2 Ac. (0.02) | --- |
| 3429 | 1771 | 1215 | 6-19-31 | Jackson's Lake | Fisher Flouring Mills Co. | 0.10 | 21/1W | NENW | 26 | Dom. (0.01) & Irr. 3 Ac. (0.09) | --- |
| 13593 | 10318 | 6690 | 9-15-55 | Unnamed stream | (b) (6) [redacted] | 0.01 | 21/1W | NENW | 35 | Industrial Processing | S, L |
| 15356 | 11391 | 7548 | 3-24-59 | Unnamed springs | | 0.03 | 21/1W | SESW | 26 | Dom. (0.01) & Irr. 2 Ac. (0.02) | S |

## KITSAP PENINSULA

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Unnamed Stream Tributary Von Geldern Cove (376)** | | | | | | |
| 15814 | 11769 | 8178 | 12-18-59 | Unnamed spring | (b) (6) [redacted] | 0.02 | 20/1W | S½SW | 2 | Dom. (0.01) & Stock (0.01) | S |
| R17178 | | | 3-13-62 | Unnamed stream | (b) (6) [redacted] et al | 450a.f. | 21/1W | NESW | 34 | Recreation & Beautification | --- |
| | | | | | **Unnamed Spring Tributary Lake Bay** | | | | | | |
| 2423 | 1246 | 805 | 9-22-28 | Unnamed spring | (b) (6) [redacted] | 0.02 | 20/1E | Govt. Lot 1 | 6 | Dom. | --- |
| 2548 | 1360 | 1427 | 3-18-29 | Unnamed spring | | 0.05 | 20/1E | Govt. Lot 1 | 6 | Dom. (0.01) & Irr. Lawn & Garden (0.04) | --- |
| 3128 | 1714 | 618 | 9-8-30 | Unnamed spring | | 0.06 | 20/1E | Govt. Lot 1 | 6 | Dom. (0.01) & Irr. 1.5 Ac. (0.05) | --- |
| | | | | | **Unnamed Spring Tributary Lake Bay** | | | | | | |
| *10432 | 7613 | 4488 | 6-22-51 | Unnamed spring | Northwest Bible Schools | 0.02 | 20/1E | Govt. Lot 1 | 6 | Camp Dom. | S |
| | | | | | **Unnamed Stream Tributary Filuce Bay (385)** | | | | | | |
| 3454 | 1867 | 740 | 7-17-31 | Unnamed stream | (b) (6) [redacted] | 0.20 | 20/1W | SWSE | 14 | Dom. (0.01) & Irr. 10 Ac. (0.19) | --- |
| 10361 | 7583 | 7047 | 5-24-51 | Unnamed stream | | 0.05 | 20/1W | NENE | 23 | Irr. 5 Ac. | S |
| 12658 | 9478 | 6701 | 11-16-53 | Five unnamed springs | | 0.26 | 20/1W | N½NE | 23 | Dom. (0.01) & Irr. 25 Ac. (0.25) | O |
| 12661 | 9461 | 6222 | 11-18-53 | Two unnamed ponds & two unnamed streams | | 0.11 | 20/1W | SESE | 14 | Dom. (0.01) & Irr. 10 Ac. (0.10) | --- |
| | | | | | **Unnamed Stream Tributary Filuce Bay (386)** | | | | | | |
| 16517 | 12288 | 8165 | 2-6-61 | Unnamed spring | (b) (6) [redacted] | 0.01 | 20/1W | SENE | 23 | Dom. | S |
| | | | | | **Unnamed Stream Tributary Filuce Bay (387)** | | | | | | |
| **13897 | 10520 | 7122 | 6-4-56 | Unnamed drainage ditch | (b) (6) [redacted] | 0.25 | 20/1W | SESE | 26 | Irr. 25 Ac. | --- |
| | | | | | **Unnamed Stream Tributary Taylor Bay (390)** | | | | | | |
| **13897 | 10520 | 7122 | 6-4-56 | Unnamed spring | (b) (6) [redacted] | 0.25 | 20/1W | SESE | 26 | Irr. 25 Ac. | --- |
| 17241 | 12768 | | 4-19-62 | Two unnamed streams | | 0.85 | 20/1W | S½NE | 26 | Irr. 85 Ac. (0.85) & Fish Prop. | S |
| | | | | | **Unnamed Stream Tributary Taylor Bay (391)** | | | | | | |
| 14440 | 10810 | 7136 | 8-9-57 | Unnamed spring | (b) (6) [redacted] | 0.01 | 20/1W | Govt. Lot 1 and/or 4 | 26 | Dom. | S, D |
| | | | | | **Unnamed Stream Tributary Case Inlet (401)** | | | | | | |
| 13142 | 9830 | 7443 | 9-28-54 | Unnamed reservoir in unnamed stream & spring | (b) (6) [redacted] | 0.50 | 21/1W | N½NW | 23 | Fish Prop. (0.49) & Dom. (0.01) | S |
| | | | | | **Dutcher Creek Tributary Dutcher Cove (402)** | | | | | | |
| 7934 | 5266 | 4407 | 7-18-47 | Dutcher Creek & reservoir in unnamed stream | (b) (6) [redacted] | 0.20 | 21/1W | SWSE | 11 | Irr. 20 Ac. | S, D, F |
| 12677 | 9501 | 6228 | 12-2-53 | Dutcher Creek | | 0.01 | 21/1W | SWSE | 11 | Irr. 1 Ac. | S, D |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maple Creek Tributary Case Inlet (405) | | | | | | |
| 7245 | 4749 | 2655 | 6-13-46 | Maple Creek | (b) (6) [redacted] | 0.01 | 21/1W | Govt. Lot 5 | 3 | Dom. | S |
| 3159 | 1593 | 471 | 9-18-30 | Maple Creek | | 1.00 | 21/1W | Govt. Lot 5 | 3 | Power (0.98), Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| | | | | | Unnamed Stream Tributary Vaughn Bay (406) | | | | | | |
| 6757 | 4556 | 3184 | 11-13-45 | Unnamed stream | (b) (6) [redacted] | 0.10 | 21/1W | Govt. Lot 6 | 2 | Dom. (0.01) & Irr. 10 Ac. (0.09) | S |
| | | | | | Unnamed Stream Tributary Vaughn Bay (407) | | | | | | |
| 14023 | 10485 | 6743 | 8-13-56 | Unnamed stream | (b) (6) [redacted] | 0.02 | 21/1W | Govt. Lot 5 | 2 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Vaughn Bay (409) | | | | | | |
| 1647 | 755 | 227 | 3-18-26 | Unnamed stream | (b) (6) [redacted] | 0.10 | 21/1W | NESE | 2 | Manufacturing | --- |
| | | | | | Unnamed Stream Tributary Vaughn Bay (410) | | | | | | |
| 9877 | 6991 | 5408 | 9-8-50 | Unnamed spring | (b) (6) [redacted] | 0.01 | 21/1W | NENW | 1 | Dom. | S |
| 16165 | 12115 | 8056 | 7-5-60 | Unnamed spring | | 0.04 | 21/1W | NENE | 2 | Dom. (0.01) & Irr. 3 Ac. (0.03) | --- |
| | | | | | Unnamed Stream Tributary Vaughn Bay (412) | | | | | | |
| 8090 | 5617 | 3253 | 10-24-47 | Unnamed spring | (b) (6) [redacted] | 0.01 | 21/1W | Govt. Lot 1 | 2 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Rocky Bay (414) | | | | | | |
| 2963 | 1697 | 1912 | 4-28-30 | Unnamed stream | (b) (6) [redacted] | 0.02 | 22/1W | Govt. Lot 4 | 34 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| | | | | | Unnamed Spring Tributary Rocky Bay | | | | | | |
| 17206 | 12701 | | 3-28-62 | Unnamed spring | (b) (6) [redacted] | 0.01 | 22/1W | Govt. Lot 2 | 27 | Dom. | S |
| | | | | | Unnamed Stream Tributary North Bay (417) | | | | | | |
| 12943 | 9732 | 7430 | 5-25-54 | Unnamed stream | (b) (6) [redacted] | 0.03 | 22/1W | Govt. Lot 4 | 28 | Fish Prop. (0.03), Fire Prot. & Irr. 2 Ac. (0.02 reused) | --- |
| | | | | | Unnamed Stream Tributary North Bay (418) | | | | | | |
| 10998 | 8019 | 5027 | 1-24-52 | Unnamed stream | (b) (6) [redacted] | 0.20 | 22/1W | NWNE | 28 | Irr. 20 Ac. | S |
| | | | | | Sisson Creek Drainage Tributary North Bay (419) | | | | | | |
| 3090 | 1567 | 984 | 8-16-30 | Unnamed spring | (b) (6) [redacted] | 0.01 | 22/1W | SWSE | 21 | Dom. & Irr. 1 Ac. | --- |
| 3102 | 1562 | 988 | 8-20-30 | Unnamed stream | | 0.02 | 22/1W | SWSE | 21 | Dom. (0.01) & Irr. 1 Ac. (0.01) | --- |
| | | | | | Unnamed Stream Tributary North Bay (420) | | | | | | |
| 1531 | 2139 | 1022 | 10-26-25 | Unnamed stream | (b) (6) [redacted] | 0.06 | 22/1W | Govt. Lot 4 | 16 | Irr. 4 Ac. | --- |
| 6765 | 4360 | 2421 | 11-15-45 | Unnamed stream | | 0.04 | 22/1W | Govt. Lot 1 | 21 | Dom. (0.01) & Irr. 9 Ac. (0.03) | --- |

* Certificate in error, change required.
** Diversion allowed from either unnamed drainage ditch or spring - total not to exceed 0.25 c.f.s.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KITSAP PENINSULA | | | | | | |
| | | | | | Unnamed Stream Tributary North Bay (423) | | | | | | |
| 1612 | 756 | 1190 | 2-13-26 | Unnamed stream | (b) (6) [redacted] | 1.00 | 22/1W | Govt. Lot 2 | 16 | Dom. (0.01), Power (0.91) & Irr. 8 Ac. (0.08) | --- |
| 8558 | 5885 | 4004 | 8-19-48 | Unnamed stream | | 0.02 | 22/1W | Govt. Lot 2 | 16 | Dom. (0.01) & Irr. 1.5 Ac. (0.01) | S |
| | | | | | Unnamed Stream Tributary North Bay (424) | | | | | | |
| 1793 | 792 | 317 | 7-15-26 | Unnamed spring | (b) (6) [redacted] | 0.02 | 22/1W | Govt. Lot 1 | 16 | Dom. (0.01) & Irr. 3 Ac. (0.01) | --- |
| | | | | | Coulter Creek Tributary North Bay (425) | | | | | | |
| 10147 | 7243 | 4834 | 2-26-51 | Coulter Creek | (b) (6) [redacted] | 0.05 | 22/1W | NENW | 9 | Irr. 5 Ac. | S, D |
| 10286 | 7505 | 4840 | 5-2-51 | Coulter Creek | | 0.01 | 22/1W | NENW | 9 | Dom. | S |
| 13264 | 9912 | | 1-24-55 | Coulter Creek | | 0.10 | 22/1W | NWNE | 9 | Dom. (0.01) & Irr. 17 Ac. (0.09) | S, D |
| | | | | | BAINBRIDGE ISLAND | | | | | | |
| | | | | | Unnamed Stream Tributary Port Madison (427) | | | | | | |
| *12389 | 9197 | 6936 | 6-3-53 | Unnamed stream | (b) (6) [redacted] | 0.11 | 26/2E | NENE | 33 | Irr. 20 Ac. | --- |
| | | | | | Unnamed Stream Tributary Port Madison (428) | | | | | | |
| *12389 | 9197 | 6936 | 6-3-53 | Unnamed stream | (b) (6) [redacted] | 0.11 | 26/2E | NWNW | 34 | Irr. 20 Ac. | --- |
| 14507 | 10850 | 8214 | 9-20-57 | Two unnamed ponds | Bloedel Timberlands Development, Inc. | 0.17 | 26/2E | SENE | 33 | Irr. 65 Ac. | --- |
| | | | | | Unnamed Stream Tributary Port Madison | | | | | | |
| 17510 | 12857 | | 9-12-62 | Unnamed stream | (b) (6) [redacted] | 0.05 | 26/2E | NESW | 33 | Irr. 5 Ac. | --- |
| | | | | | Unnamed Drainage Tributary Port Madison | | | | | | |
| 16321 | 12131 | 8521 | 9-6-60 | Pond in unnamed drainage | (b) (6) [redacted] | 0.27 | 26/2E | S½SW | 35 | Irr. 27 Ac. | --- |
| | | | | | Port Madison Creek Tributary Puget Sound (431) | | | | | | |
| 7084 | 4561 | 5336 | 4-30-46 | Unnamed springs | (b) (6) [redacted] | 0.15 | 25/2E | NESW | 2 | Com. Dom. | --- |
| 16101 | 12599 | | 6-7-60 | Port Madison Creek | | 0.06 | 25/2E | NESE | 3 | Dom. (0.01) & Irr. 5 Ac. (0.05) | --- |
| | | | | | Unnamed Stream Tributary Puget Sound (432) | | | | | | |
| 16666 | 12359 | | 5-4-61 | Unnamed springs | (b) (6) [redacted] | 0.02 | 25/2E | SENW | 11 | Irr. 2 Ac. | S |
| | | | | | Unnamed Stream Tributary Murden Cove (434) | | | | | | |
| 10012 | 7136 | 5100 | 12-4-50 | Unnamed reservoir & unnamed spring | (b) (6) [redacted] | 0.20 | 25/2E | NENE | 16 | Irr. 20 Ac. | --- |
| 10751 | 7849 | 5457 | 9-25-51 | Unnamed stream | | 0.10 | 25/2E | NENW | 22 | Irr. 20 Ac. | S, D |
| 17313 | 12785 | | 5-29-62 | Unnamed stream & spring | | 0.05 | 25/2E | SESW | 15 | Irr. 4 Ac. (0.04) & Dom. (0.01) | S |

Unnamed Stream Tributary Murden Cove (435)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16973 | 12603 | | 10-18-61 | Unnamed stream & springs | (b) (6) [redacted] | 0.10 | 25/2E | NENE | 22 | Group Dom. | --- |

Unnamed Stream Tributary Eagle Harbor (437)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11172 | 8200 | 5401 | 3-20-52 | Reservoir in unnamed stream | (b) (6) [redacted] | 0.20 | 25/2E | SWSW | 23 | Irr. 25 Ac. | --- |

Unnamed Stream Tributary Eagle Harbor (439)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5583 | 3475 | 1803 | 9-13-41 | Unnamed spring | (b) (6) [redacted] | 0.02 | 25/2E | NESE | 28 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| 14865 | 12027 | 7943 | 6-25-58 | Unnamed stream | Town of Winslow | 0.35 | 25/2E | SWNW | 27 | Municipal Supply | S |

Unnamed Stream Tributary Eagle Harbor (440)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14920 | 12062 | 7567 | 7-21-58 | Storage of unnamed stream | (b) (6) [redacted] | 0.03 | 25/2E | NESW | 34 | Irr. 2.5 Ac. | S |

Unnamed Stream Tributary Blakely Harbor (447)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10049 | 7075 | 5698 | 1-4-51 | Unnamed stream | (b) (6) [redacted] | 0.01 | 24/2E | Govt. Lot 1 | 11 | Irr. 1½ Ac. | S, D |

Unnamed Stream Tributary Puget Sound (449)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3006 | 2026 | 793 | 6-7-30 | Unnamed stream | (b) (6) [redacted] | 0.50 | 24/2E | SWSE | 11 | Com. Dom. | --- |

Unnamed Stream Tributary Puget Sound (450)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5476 | 3397 | 1938 | 5-31-41 | Unnamed spring | (b) (6) [redacted] | 0.01 | 24/2E | Govt. Lot 2 | 14 | Dom. & Irr. 1 Ac. | --- |

Edenharter Creek Tributary Rich Passage (452)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6082 | 3940 | 2287 | 7-24-44 | Edenharter Creek | (b) (6) [redacted] | 0.25 | 25/2E | NESE | 33 | Dom. (0.01), Stock, & Irr. 25 Ac. (0.24) | --- |

Unnamed Stream Tributary Port Orchard (454)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15953 | 12203 | 8077 | 3-15-60 | Unnamed stream | (b) (6) [redacted] | 0.01 | 24/2E | Govt. Lot 3 | 5 | Irr. 0.75 Ac. | --- |

Unnamed Stream Tributary Port Orchard (456)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 17514 | 12933 | | 8-13-62 | Unnamed spring | South Bainbridge Water Co. | 0.15 | 25/2E | Govt. Lot 4 | 32 | Com. Dom. | C, S |
| 17515 | 12934 | | 8-13-62 | Unnamed spring | South Bainbridge Water Co. | 0.05 | 25/2E | Govt. Lot 4 | 32 | Com. Dom. | C, S |

Unnamed Spring Tributary Port Orchard

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14425 | 10842 | 7433 | 7-31-57 | Unnamed spring | (b) (6) [redacted] | 0.01 | 25/2E | Govt. Lot 4 | 32 | Dom. | --- |

Unnamed Spring Tributary Port Orchard

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16182 | 11907 | 8304 | 7-15-60 | Unnamed spring | (b) (6) [redacted] | 0.01 | 25/2E | Govt. Lot 4 | 32 | Dom. & Fire Prot. | S |

Unnamed Stream Tributary Port Orchard (457)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12785 | 9631 | 6328 | 2-24-54 | Unnamed stream | (b) (6) [redacted] | 0.02 | 25/2E | Govt. Lot 3 | 32 | Dom. (0.01) & Irr. 0.33 Ac. (0.01) | --- |

* Diversion allowed from either unnamed stream (427) or (428) - total not to exceed 0.11 c.f.s.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | BAINBRIDGE ISLAND | | | | | | |
| | | | | | Unnamed Stream Tributary Fletcher Bay (461) | | | | | | |
| 7202 | 4652 | 5436 | 6-1-46 | Unnamed stream | (b) (6) [redacted] | 0.15 | 25/2E | NESE | 20 | Irr. 15 Ac. | --- |
| 8759 | 6866 | 4964 | 4-19-49 | Unnamed stream | | 0.04 | 25/2E | NWNW | 21 | Dom. (0.01) & Irr. 4 Ac. (0.03) | --- |
| 9368 | 6871 | 3940 | 2-8-50 | Unnamed stream | | 0.08 | 25/2E | NENE | 20 | Irr. 8 Ac. | --- |
| 12249 | 9097 | | 4-13-53 | Two unnamed streams | | 0.20 | 25/2E | S½NW | 28 | Irr. 40 Ac. | --- |
| 16256 | 12193 | | 8-10-60 | Unnamed spring | | 0.05 | 25/2E | NENW | 28 | Irr. 5 Ac. | --- |
| 16354 | 12182 | | 9-27-60 | Unnamed stream | | 0.05 | 25/2E | SWSW | 21 | Irr. 5 Ac. | --- |
| 16355 | 12135 | | 9-27-60 | Unnamed pond | | 0.10 | 25/2E | SESW | 21 | Irr. 10 Ac. | --- |
| | | | | | Unnamed Spring Tributary Fletcher Bay | | | | | | |
| 6090 | 4047 | 2714 | 7-31-44 | Unnamed spring | (b) (6) [redacted] | 0.01 | 25/2E | Govt. Lot 2 | 20 | Dom., Fish, & Garden Irr. | --- |
| | | | | | Unnamed Stream Tributary Manzanita Bay (463) | | | | | | |
| 6931 | 9246 | 6592 | 2-27-46 | Unnamed stream | (b) (6) [redacted] | 0.30 | 25/2E | NESE | 9 | Irr. 30 Ac. | S |
| 10008 | 7097 | | 11-29-50 | Unnamed stream | | 0.10 | 25/2E | SESW | 4 | Irr. 10 Ac. | --- |
| 12925 | 9711 | 6351 | 5-17-54 | Unnamed reservoir in unnamed stream | | 0.18 | 25/2E | NWNE | 10 | Irr. 18 Ac. | --- |
| 15030 | 11146 | | 8-29-58 | Unnamed reservoir in unnamed stream | | 0.20 | 25/2E | SESW | 4 | Irr. 20 Ac. | S |
| *R15935 | R242 | | 3-7-60 | Unnamed stream | | 16 a.f. | 25/2E | SESW | 4 | Irr. 8½ Ac. | --- |
| 16839 | 12537 | | 8-11-61 | Unnamed pond | | 0.15 | 25/2E | SENW | 4 | Irr. 15 Ac. | --- |
| | | | | | Unnamed Stream Tributary Agate Passage (464) | | | | | | |
| 1174 | 500 | 165 | 8-21-24 | Unnamed spring | (b) (6) [redacted] | 0.25 | 26/2E | Govt. Lot 1 | 28 | Dom. (0.01) & Irr. 10 Ac. (0.24) | --- |
| 11556 | 8456 | 7400 | 7-29-52 | Unnamed springs | | 0.02 | 26/2E | SWSW | 28 | Dom. | C |
| | | | | | MAURY AND VASHON ISLANDS | | | | | | |
| | | | | | Unnamed Spring Tributary Puget Sound (466) | | | | | | |
| 15097 | 11288 | 7511 | 9-23-58 | Unnamed spring | (b) (6) [redacted] | 0.01 | 23/3E | Govt. Lot 5 | 7 | Dom. | S |
| | | | | | Unnamed Stream Tributary Puget Sound (468) | | | | | | |
| 3158 | 1677 | 862 | 9-18-30 | Unnamed spring | Heights Water Corp. | 0.05 | 23/3E | Govt. Lot 5 | 18 | Dom. | --- |
| 3324 | 2482 | 1556 | 3-16-31 | Unnamed spring | Heights Water Corp. | 0.10 | 23/3E | Govt. Lot 5 | 18 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Puget Sound (469) | | | | | | |
| 1415 | 601 | 185 | 8-28-25 | Unnamed spring | (b) (6) [redacted] et al | 0.02 | 23/3E | SENE | 18 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Puget Sound (470) | | | | | | |
| 1860 | 760 | 238 | 8-25-26 | Unnamed stream | (b) (6) [redacted] | 0.01 | 23/3E | NESE | 18 | Dom. | --- |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Unnamed Springs Tributary Puget Sound (472) | | | | | | |
| 7917 | 5282 | 3330 | 7-7-47 | Unnamed spring | (b) (6) [redacted] | 0.01 | 23/3E | Govt. Lot 3 | 17 | Dom. | --- |
| 10131 | 7287 | 4084 | 2-16-51 | Unnamed spring | | 0.01 | 23/3E | Govt. Lot 3 | 17 | Dom. | --- |
| 14468 | 10825 | 7042 | 8-28-57 | Unnamed spring | | 0.01 | 23/3E | Govt. Lot 3 | 17 | Dom. | --- |
| 14560 | 10986 | 7228 | 10-29-57 | Unnamed spring | | 0.01 | 23/3E | Govt. Lot 3 | 17 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Puget Sound (473) | | | | | | |
| 14432 | 10799 | 7000 | 8-5-57 | Unnamed spring | (b) (6) [redacted] et al | 0.03 | 23/3E | Govt. Lot 3 | 17 | Dom. | --- |
| | | | | | Unnamed Spring Tributary Puget Sound | | | | | | |
| 10906 | 8103 | 5310 | 12-5-51 | Unnamed spring | (b) (6) [redacted] | 0.01 | 23/3E | Govt. Lot 1 | 20 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Puget Sound (474) | | | | | | |
| 3403 | 1937 | 920 | 5-26-31 | Unnamed spring | (b) (6) [redacted] | 0.06 | 23/3E | NENW | 20 | Group Dom. | --- |
| | | | | | Unnamed Stream Tributary Puget Sound (477) | | | | | | |
| 7459 | 5074 | 2770 | 9-23-46 | Unnamed spring & stream | (b) (6) [redacted] | 0.01 | 23/3E | SWNE | 29 | Dom. | --- |
| 10446 | 7426 | 4837 | 6-28-51 | Unnamed stream | | 0.12 | 23/3E | SWNE | 29 | Irr. 12 Ac. | S |
| | | | | | Unnamed Stream Tributary Puget Sound (478) | | | | | | |
| 2535 | 1311 | 366 | 2-26-29 | Unnamed stream | (b) [redacted] | 0.01 | 23/3E | NWSW | 29 | Dom. | --- |
| | | | | | Beall Creek Tributary Puget Sound (479) | | | | | | |
| 1490 | 588 | 887 | 9-11-25 | Beall Creek | Water District No. 19, King County | 0.90 | 23/3E | S½SE | 29 | Com. Dom. | F |
| 15853 | 11805 | | 1-18-60 | Beall Creek | (b) [redacted] | 0.185 | 23/3E | Govt. Lot 4 | 29 | Dom. (0.01) & Irr. 17.5 Ac. (0.175) | S |
| 15998 | 11834 | 8145 | 4-14-60 | Beall Creek & unnamed springs | Beall Greenhouse Co. | 0.40 | 23/3E | SWSE W½NE | 29 32 | Greenhouse use | S |
| | | | | | Unnamed Springs Tributary Puget Sound | | | | | | |
| 11488 | 8405 | | 6-30-52 | Unnamed springs | (b) (6) [redacted] | 0.10 | 23/3E | Govt. Lot 2 | 32 | Dom. (0.01) & Irr. 10 Ac. (0.09) | --- |
| | | | | | Ellis Creek Drainage Tributary Tramp Harbor (482) | | | | | | |
| **1279 | 592 | 314 | 3-4-25 | Ellis Creek | (b) (6) [redacted] | 0.15 | 22/3E | Govt. Lot 4 | 4 | Dom. (0.01), Irr. Lawn and Garden 1 Ac. (0.01), & Power (ram) (0.13) | --- |
| **1925 | 841 | 836 | 11-14-26 | Unnamed stream | Island Mutual Water System | 0.50 | 22/3E | NENE | 8 | Com. Dom. | --- |
| | | | | | Unnamed Stream Tributary Puget Sound (483) | | | | | | |
| 13088 | 9864 | | 8-19-54 | Unnamed springs | Maury Mutual Water Co. | 0.50 | 22/3E | NESW | 15 | Com. Dom. | --- |
| 13694 | 10196 | 6461 | 1-5-56 | Unnamed stream | (b) (6) [redacted] | 0.01 | 22/3E | Govt. Lot 2 | 15 | Dom. | S |
| | | | | | Unnamed Spring Tributary Puget Sound | | | | | | |
| 14344 | 10725 | 6906 | 5-28-57 | Unnamed spring | (b) (6) [redacted] | 0.01 | 22/3E | Govt. Lot 2 | 14 | Dom. | --- |

* To irrigate same land as Permit No. 7097.

** Certificate in error, change required.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MAURY AND VASHON ISLANDS | | | | | | |
| | | | | | Unnamed Spring Tributary Puget Sound | | | | | | |
| 14469 | 10826 | 7036 | 8-28-57 | Unnamed spring | [redacted] | 0.01 | 22/3E | Govt. Lot 2 | 14 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Puget Sound | | | | | | |
| 5551 | 3452 | 1767 | 8-9-41 | Unnamed stream | [redacted] | 0.005 | 22/3E | Govt. Lot 2 | 14 | Dom. | --- |
| | | | | | Unnamed Spring Tributary Puget Sound (485) | | | | | | |
| 15129 | 11186 | 7738 | 10-3-58 | Unnamed spring | [redacted] | 0.01 | 22/3E | Govt. Lot 2 | 14 | Dom. | S |
| 14379 | 10772 | 6960 | 6-20-57 | Unnamed spring | | 0.01 | 22/3E | Govt. Lot 3 | 14 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Puget Sound (489) | | | | | | |
| 1903 | 876 | 237 | 10-13-26 | Unnamed spring | [redacted] | 0.025 | 22/3E | SESE | 21 | Dom. (0.01) & Irr. 5 Ac. (0.015) | --- |
| | | | | | Unnamed Stream Tributary Puget Sound | | | | | | |
| 13617 | 10184 | | 9-28-55 | Unnamed stream | Wise Investment Co., Inc. | 0.20 | 22/3E | Govt. Lot 2 | 32 | Com. Dom. | --- |
| 14924 | 12036 | 7667 | 7-20-58 | Unnamed stream | [redacted] | 0.01 | 22/3E | SWNE | 32 | Dom. | S, D |
| | | | | | Unnamed Stream Tributary Quartermaster Harbor (500) | | | | | | |
| 7227 | 5394 | 3725 | 6-10-46 | Unnamed spring | [redacted] | 0.01 | 22/3E | Govt. Lot 4 | 30 | Dom. | --- |
| 4477 | 2537 | 6734 | 11-12-37 | Unnamed stream & tributary spring | Dockton Improvement Co. | 0.04 | 22/3E | SESE | 30 | Dom. | --- |
| 15143 | 11210 | 8677 | 10-16-58 | Unnamed stream | [redacted] | 0.09 | 22/3E | Govt. Lot 3 | 30 | Dom. (0.01) & Irr. 8 Ac. (0.08) | --- |
| | | | | | Unnamed Stream Tributary Quartermaster Harbor (501) | | | | | | |
| 10800 | 7810 | 4669 | 10-11-51 | Unnamed stream | [redacted] | 0.16 | 22/3E | Govt. Lot 2 | 29 | Com. Dom. | S |
| Certificate of Change 548 | | | | | | | | | | | |
| | | | | | Unnamed Stream Tributary Quartermaster Harbor (504) | | | | | | |
| 13968 | 10591 | | 7-12-56 | Unnamed stream & spring | [redacted] | 0.03 | 22/3E | Govt. Lot 5 | 20 | Com. Dom. | --- |
| | | | | | Unnamed Stream Tributary Quartermaster Harbor (506) | | | | | | |
| 11769 | 8881 | | 10-20-52 | Unnamed stream & spring | [redacted] | 0.20 | 22/3E | Govt. Lot 8 | 16 | Dom. (0.01) & Irr. 20 Ac. (0.19) | --- |
| 17114 | 12665 | | 1-24-62 | Unnamed spring | | 0.06 | 22/3E | Govt. Lot 1 | 21 | Irr. 5 Ac. (0.05) & Dom. (0.01) | --- |
| | | | | | Unnamed Stream Tributary Quartermaster Harbor (508) | | | | | | |
| 7264 | 4746 | 2641 | 6-19-46 | Unnamed springs | [redacted] et al | 0.03 | 22/3E | Govt. Lot 3 | 8 | Group Dom. | --- |

Judd Creek Drainage (510)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Judd Creek Tributary Quartermaster Harbor | | | | | | | |
| 3061 | 1653 | 502 | 7-28-30 | Judd Creek | (b) (6) [redacted] | 0.005 | 22/2E | SWNW | 1 | Dom. | --- |
| 3314 | 1703 | 518 | 3-6-31 | Judd Creek | | 0.07 | 22/2E | SENW | 1 | Irr. 5 Ac. | --- |
| 8677 | 6074 | 4052 | 1-12-49 | Judd Creek | | 0.15 | 22/2E | NESE | 1 | Irr. 15 to 20 Ac. | S, D |
| 9706 | 7300 | 4158 | 6-21-50 | Judd Creek | | 0.05 | 22/2E | SENW | 1 | Irr. 5 Ac. | --- |
| | | | | Various Tributaries Judd Creek | | | | | | | |
| 1698 | 741 | 1154 | 4-27-26 | Unnamed stream | (b) (6) [redacted] | 0.10 | 22/3E | SESW | 7 | Dom. (0.01) & Irr. 12 Ac. (0.09) | --- |
| 5572 | 3469 | 1971 | 9-3-41 | Fitzpatrick Spring No. 1 | | 0.06 | 22/3E | SESW | 7 | Dom. (0.01), Stock, & Power (0.05) | --- |
| 5589 | 3470 | 1972 | 9-17-41 | Fitzpatrick Spring No. 2 | | 0.04 | 22/3E | NWSW | 7 | Dom. (0.01) & Stock (0.03) | --- |
| 7809 | 5247 | 4871 | 5-9-47 | E. Fork Judd Creek | | 0.01 | 22/3E | NENW | 6 | Dom. | S |
| 8795 | 6092 | 3822 | 5-17-49 | Unnamed spring | | 0.02 | 22/3E | SWNW | 7 | Dom. | --- |
| 8889 | 6401 | 3915 | 7-7-49 | Unnamed springs | | 0.02 | 22/3E | NESW | 7 | Dom. (0.01) & Stock (0.01) | --- |
| 11745 | 8722 | 5631 | 10-8-52 | Unnamed stream | | 0.01 | 22/3E | NWNE | 18 | Dom. | --- |
| 11994 | 9083 | 5902 | 1-14-53 | Unnamed brook | | 0.07 | 22/3E | NWSE | 6 | Irr. 7 Ac. | --- |
| 13145 | 9834 | 6309 | 10-4-54 | Unnamed creek | | 0.20 | 22/3E | NWNE | 6 | Irr. 20 Ac. | --- |
| 14473 | 10870 | 7192 | 9-3-57 | Unnamed stream | | 0.01 | 22/3E | SWNW | 5 | Stock | --- |
| 15015 | 11219 | 8123 | 8-21-58 | Unnamed spring | | 0.01 | 22/3E | NWNW | 7 | Dom. | S |
| 15749 | 11843 | 8584 | 11-2-59 | Unnamed springs & pond | | 0.11 | 22/3E | NESW | 6 | Dom. (0.01), Fish Prop. & Irr. 10 Ac. (0.10) | --- |
| | | | | Fisher Creek Tributary Quartermaster Harbor (514) | | | | | | | |
| 2376 | 1213 | 405 | 8-1-28 | Unnamed spring | (b) (6) [redacted] | 0.10 | 22/2E | NESE | 13 | Municipal supply | --- |
| 2404 | 1233 | 316 | 9-5-28 | Fisher Creek | | 0.05 | 22/2E | SENW | 13 | Dom. (0.01) & Power (0.04) | --- |
| 2563 | 1327 | 461 | 4-18-29 | Unnamed stream | | 0.05 | 22/2E | NESE | 13 | Dom. (0.01) & Irr. 2 Ac. (0.04) | --- |
| 3754 | 2033 | 3433 | 11-29-32 | Fisher Creek | | 0.05 | 22/2E | SENW | 13 | Dom. (0.01) & Irr. 4 Ac. (0.04) | --- |
| 4185 | 2567 | 5360 | 12-21-35 | Fisher Creek | | 0.02 | 22/2E | SESW | 13 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| 10161 | 7317 | 4272 | 3-1-51 | Unnamed spring | | 0.10 | 22/2E | NESE | 13 | Dom. (0.01) & Irr. 10 Ac. (0.09) | S |
| 10247 | 7359 | 6583 | 4-17-51 | Unnamed spring | | 0.30 | 22/2E | NENW | 13 | Irr. 30 Ac. | F |
| R12657 | R197 | 6583 | 11-16-53 | Unnamed spring | | 25 a.f. | 22/2E | NENW | 13 | Irr. | --- |
| 13662 | 10187 | 7780 | 11-9-55 | Fisher Creek | | 0.01 | 22/2E | SWSE | 13 | Dom. | S, D |
| | | | | Unnamed Spring Tributary Quartermaster Harbor | | | | | | | |
| 7938 | 5272 | 3310 | 7-22-47 | Unnamed spring | (b) (6) [redacted] | 0.01 | 22/2E | Govt. Lot 2 | 25 | Dom. | --- |
| | | | | Unnamed Springs Tributary Quartermaster Harbor | | | | | | | |
| 11115 | 8131 | 4721 | 3-4-52 | Two unnamed springs | (b) (6) [redacted] | 0.01 | 22/2E | Govt. Lot 4 | 25 | Dom. | S, D |
| | | | | Unnamed Spring Tributary Dalco Passage | | | | | | | |
| 3566 | 1834 | 833 | 11-30-31 | Unnamed spring | Smith Cove Water Association | 0.044 | 21/2E | Govt. Lot 1 | 1 | Dom. & Landscaping | --- |
| | | | | Unnamed Spring Tributary Dalco Passage | | | | | | | |
| 3368 | 1842 | 751 | 4-29-31 | Unnamed spring | (b) (6) [redacted] | 0.006 | 21/2E | Govt. Lot 1 | 1 | Dom. | --- |
| | | | | Unnamed Spring Tributary Dalco Passage | | | | | | | |
| 5928 | 3784 | 2468 | 11-26-43 | Unnamed spring | (b) (6) [redacted] | 0.02 | 21/2E | Govt. Lot 1 | 1 | Dom. (0.01) & Irr. 2 Ac. (0.01) | --- |
| | | | | Unnamed Springs Tributary Dalco Passage | | | | | | | |
| 5896 | 3743 | 3292 | 9-7-43 | Unnamed spring | (b) (6) [redacted] | 0.05 | 21/2E | Govt. Lot 1 | 1 | Dom. (0.01) & Garden Irr. (0.04) | --- |
| | | | | Unnamed Spring Tributary Dalco Passage | | | | | | | |
| 17386 | 12816 | 8619 | 7-6-62 | Unnamed spring | (b) (6) [redacted] | 0.01 | 21/2E | SWSW | 1 | Dom. | S |

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R. | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **MAURY AND VASHON ISLANDS** | | | | | | |
| | | | | | **Tahlequah Creek Tributary Dalco Passage (518)** | | | | | | |
| 7973 | 5303 | 3429 | 8-8-47 | Tahlequah Creek | (b) (6) | 0.01 | 21/2E | Govt. Lot 5 | 2 | Dom. | --- |
| 12600 | 9374 | 6396 | 9-30-53 | Unnamed spring | | 0.01 | 21/2E | SENE | 2 | Dom. | S, D |
| 17516 | 12904 | | 9-14-62 | Tahlequah Creek | | 0.01 | 21/2E | Govt. Lot 5 & NESE | 2 | Dom. | S |
| 17517 | 12873 | | 9-14-62 | Tahlequah Creek | | 0.01 | 21/2E | NESE | 2 | Dom. | S |
| 17518 | 12908 | | 9-14-62 | Tahlequah Creek | | 0.01 | 21/2E | Govt. Lot 5 & NESE | 2 | Dom. | S |
| | | | | | **Unnamed Spring Tributary Dalco Passage** | | | | | | |
| 8839 | 6084 | 3462 | 6-13-49 | Unnamed spring | (b) (6) | 0.005 | 21/2E | Govt. Lot 2 | 2 | Dom. | --- |
| 14363 | 10757 | 7530 | 6-11-57 | Unnamed spring | | 0.01 | 21/2E | Govt. Lot 2 | 2 | Dom. | --- |
| 17025 | 12581 | 8402 | 11-20-61 | Unnamed spring | | 0.01 | 21/2E | Govt. Lot 2 | 2 | Dom. & Stock | --- |
| | | | | | **Unnamed Stream Tributary Colvos Passage (526)** | | | | | | |
| 7468 | 5333 | 3502 | 9-27-46 | Unnamed stream & springs | (b) (6) | 0.05 | 22/2E | Govt. Lot 4 & SWSE | 23 | Dom. (0.01) & Fire Prot. (0.04) | --- |
| | | | | | **Unnamed Stream Tributary Colvos Passage (527)** | | | | | | |
| 13876 | 10436 | 7955 | 5-28-56 | Unnamed spring | (b) (6) | 0.01 | 22/2E | NWSE | 23 | Dom. | --- |
| | | | | | **Unnamed Springs Tributary Colvos Passage (528)** | | | | | | |
| 14031 | 10471 | 7402 | 8-15-56 | Unnamed springs | (b) (6) | 0.02 | 22/2E | NWSW | 23 | Dom. | --- |
| | | | | | **Unnamed Stream Tributary Colvos Passage (529)** | | | | | | |
| 16024 | 11937 | | 4-21-60 | Unnamed stream & spring | (b) (6) | 0.16 | 22/2E | NW¼ | 23 | Dom. (0.01), Fish Prop. (0.10) & Irr. 5 Ac. (0.05) | --- |
| 17614 | | | 11-15-62 | Unnamed stream | | 0.01 | 22/2E | NWNE | 23 | Dom. | --- |
| | | | | | **Unnamed Spring Tributary Christianson Cove** | | | | | | |
| 14598 | 10903 | 7137 | 12-4-57 | Unnamed spring | (b) (6) | 0.01 | 22/2E | Govt. Lot 1 | 14 | Dom. | --- |
| | | | | | **Jod Creek Tributary Christianson Cove (530)** | | | | | | |
| 13510 | 10260 | 7551 | 6-23-55 | Unnamed stream | (b) (6) | 0.05 | 22/2E | NENW | 14 | Dom. (0.01) & Irr. 4 Ac. (0.04) | S, D |
| 14975 | 11190 | | 8-7-58 | Jod Creek & springs | | 0.56 | 22/2E | Govt. Lot 1 & NENW | 14 | Dom. (0.01), Fish Prop. (0.50) & Irr. 5 Ac. (0.05) | S, D, F, B, O |
| 15154 | 11235 | 8386 | 10-27-58 | Unnamed springs | | 0.16 | 22/2E | SWSE | 11 | Dom. (0.01) & Irr. 15 Ac. (0.15) | --- |
| | | | | | **Unnamed Spring Tributary Colvos Passage** | | | | | | |
| 16999 | 12597 | | 11-1-61 | Unnamed spring | (b) (6) | 0.01 | 22/2E | Govt. Lot 2 | 11 | Dom. | --- |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Green Valley Creek Tributary Colvos Passage (531) | | | | | | |
| *1046 | 477 | 104 | 3-3-24 | Green Valley Creek | (b) (6) [redacted] | 0.10 | 22/2E | SWSE | 12 | Dom. (0.01) & Irr. 1 Ac. (0.09) | --- |
| 1187 | 485 | 308 | 10-9-24 | Spring & unnamed creek | | 0.05 | 22/2E | NW¼ | 12 | Dom. (0.01) & Lawn and Garden Irr. 1 Ac. (0.04) | --- |
| 11607 | 8577 | 6058 | 8-20-52 | Green Valley Creek | | 0.05 | 22/2E | SWNE | 11 | Dom. (0.01) & Irr. 4 Ac. (0.04) | L |
| 11689 | 8492 | 5102 | 9-22-52 | Green Valley Creek | | 0.01 | 22/2E | SWNE | 11 | Dom. | S, D |
| | | | | | Unnamed Stream Tributary Colvos Passage (532) | | | | | | |
| 10462 | 7528 | | 7-5-51 | Unnamed stream | (b) (6) [redacted] | 0.01 | 22/2E | Govt. Lot 1 | 2 | Dom. | S, D |
| | | | | | Unnamed Springs Tributary Colvos Passage | | | | | | |
| 14541 | 10879 | | 10-9-57 | Unnamed springs | (b) (6) [redacted] | 0.02 | 23/2E | NENE | 35 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Colvos Passage (534) | | | | | | |
| 5908 | 3745 | 1988 | 9-30-43 | Unnamed spring | (b) (6) [redacted] | 0.03 | 23/2E | Govt. Lot 3 | 26 | Dom. (0.01), Stock & Irr. 6 Ac. (0.02) | --- |
| 6607 | 4358 | 4360 | 8-20-45 | Unnamed stream | | 0.05 | 23/2E | SESE | 26 | Dom. (0.01) & Irr. 5 Ac. (0.04) | --- |
| | | | | | Unnamed Stream Tributary Colvos Passage (535) | | | | | | |
| 11154 | 8290 | 4919 | 3-17-52 | Unnamed stream | (b) (6) [redacted] | 0.035 | 23/2E | NENE NWNW | 26 25 | Dom. (0.01), Manufacturing (0.005), & Fish (0.02) | --- |
| 11390 | 8680 | 5509 | 5-26-52 | Unnamed spring | | 0.035 | 23/2E | NWNW | 25 | Dom. | --- |
| 11653 | 8601 | 5950 | 9-8-52 | Unnamed streams | | 0.03 | 23/2E | NWNW | 25 | Group Dom. | --- |
| 12454 | 9337 | 5599 | 7-15-53 | Unnamed spring | | 0.005 | 23/2E | NWNW | 25 | Dom. | --- |
| 15208 | 11276 | 7815 | 12-22-58 | Unnamed stream | | 0.01 | 23/2E | NW¼ | 25 | Dom. | S |
| | | | | | Unnamed Stream Tributary Colvos Passage (536) | | | | | | |
| 13535 | 10111 | 6912 | 7-28-55 | Unnamed spring | (b) (6) [redacted] | 0.019 | 23/2E | NWNW | 25 | Dom. (0.01) & Irr. 2 Ac. (0.009) | S, D |
| | | | | | Unnamed Stream Tributary Colvos Passage (537) | | | | | | |
| 5338 | 3404 | 1723 | 1-24-41 | Unnamed spring | (b) (6) [redacted] | 0.02 | 23/2E | NWNW | 25 | Dom. (0.01) & Irr. 1.5 Ac. (0.01) | --- |
| 16084 | 12557 | | 5-25-60 | Unnamed stream | | 0.13 | 23/2E | Govt. Lot 1 | 24 | Dom. (0.01), Stock (0.01), Fish Prop. (0.10) & Irr. 1 Ac. (0.01) | S |
| 17351 | 12829 | | 6-20-62 | Unnamed stream | | 0.01 | 23/2E | NENW | 25 | Irr. 1 Ac. & Dom. | S |
| | | | | | Unnamed Stream Tributary Colvos Passage (539) | | | | | | |
| 5944 | 3963 | 2704 | 1-11-44 | Unnamed stream | (b) (6) [redacted] | 0.01 | 23/2E | Govt. Lot 3 | 24 | Dom. | --- |
| | | | | | Needle (Cedar Hurst, Shingle-Mill) Creek Tributary Fern Cove (540) | | | | | | |
| 1765 | 1010 | 864 | 6-28-26 | Unnamed spring | Seattle Goodwill Industries | 0.25 | 23/3E | NWSE NESW | 19 | Dom. (0.01) & Irr. (0.24) | --- |
| 1998 | 901 | 203 | 2-11-27 | Shingle Mill Creek | (b) (6) [redacted] | 0.22 | 23/3E | NWNE | 30 | Dom. (0.01) & Irr. 8 Ac. (0.21) | --- |
| 2009 | 2815 | 2179 | 2-19-27 | Unnamed spring | | 0.05 | 23/3E | SESW | 19 | Dom. (0.01), Stock & Power (0.04) | --- |
| 2339 | 1167 | 2743 | 6-21-28 | Needle Creek & unnamed spring | West Side Water Co. | 0.05 | 23/3E | SESW | 19 | Com. Dom. | --- |
| 15996 | 11821 | 8566 | 4-12-60 | Unnamed lake | (b) (6) [redacted] | 0.30 | 23/2E | SWSE | 25 | Dom. (0.01), mink pen cooling (0.21) & Irr. 8 Ac. (0.08) | --- |
| 17120 | 12685 | | 1-29-62 | Unnamed stream | | 0.01 | 23/3E | NWSW | 30 | Irr. ½ Ac. (0.005) & Stock (0.005) | S |

* Certificate in error, change required.

| Appl. | Permit | Cert. | Priority | Source | Name | Total Quantity (cfs) | Location of Point of Diversion (T. R.) | Subdivision | Sec.) | Use and Quantity (cfs) | Proviso |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **MAURY AND VASHON ISLANDS** | | | | | | |
| | | | | | Unnamed Creek Tributary Fern Cove (541) | | | | | | |
| 10721 | 7702 | 4683 | 9-12-51 | Unnamed creek | [redacted] | 0.01 | 23/3E | Govt. Lot 3 | 18 | Dom. | S |
| 13340 | 10001 | 6455 | 3-11-55 | Unnamed drainage ditch | | 0.12 | 23/3E | SWSE | 18 | Irr. 10 Ac. | --- |
| | | | | | Unnamed Stream Tributary Colvos Passage (544) | | | | | | |
| 10070 | 7380 | 4197 | 1-3-51 | Unnamed spring | [redacted] et al | 0.005 | 23/3E | Govt. Lot 3 | 7 | Dom. | --- |
| | | | | | Unnamed Spring Tributary Colvos Passage | | | | | | |
| 2848 | 2093 | 1564 | 2-18-30 | Unnamed spring | [redacted] | 0.01 | 23/3E | Govt. Lot 3 | 7 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Colvos Passage (545) | | | | | | |
| 2317 | 1138 | 1431 | 5-28-28 | Unnamed stream | [redacted] | 0.02 | 23/3E | NESW | 7 | Dom. (0.01) & Irr. 3/4 Ac. (0.01) | --- |
| 4128 | 2271 | 983 | 6-22-35 | Unnamed stream | | 0.005 | 23/3E | Govt. Lot 3 | 7 | Dom. | --- |
| | | | | | Unnamed Stream Tributary Colvos Passage (546) | | | | | | |
| 4500 | 2560 | 1105 | 2-16-38 | Three unnamed springs | Neighborhood Club of Sylvan Beach | 0.10 | 23/3E | Govt. Lot 2 | 7 | Group Dom. | --- |
| Certificate of Change 422 | | | | | Neighborhood Club of Sylvan Beach | | | | | | |
| | | | | | Unnamed Stream Tributary Colvos Passage (547) | | | | | | |
| 12410 | 9183 | 5515 | 6-15-53 | Unnamed spring | [redacted] | 0.005 | 23/3E | Govt. Lot 1 | 7 | Dom. | --- |
| 12455 | 9242 | 5957 | 7-16-53 | Unnamed spring | Community of Biloxi | 0.01 | 23/3E | Govt. Lot 1 | 7 | Com. Dom. | --- |
| | | | | | Unnamed Spring Tributary Colvos Passage | | | | | | |
| 16681 | 12370 | 8570 | 5-12-61 | Unnamed spring | [redacted] | 0.01 | 23/3E | Govt. Lot 1 | 6 | Dom. | S |
| | | | | | **FOX ISLAND** | | | | | | |
| | | | | | Unnamed Springs Tributary Hale Passage | | | | | | |
| 16258 | 12217 | | 8-10-61 | Two unnamed springs | [redacted] | 0.06 | 21/1E | Govt. Lot 6 | 27 | Group Dom. | S |
| | | | | | Unnamed Spring Tributary Hale Passage | | | | | | |
| 16413 | 12189 | 8043 | 10-27-60 | Unnamed spring | [redacted] | 0.01 | 21/1E | Govt. Lot 5 | 35 | Dom. | S |
| | | | | | Myrtle Creek Tributary Hale Passage (548) | | | | | | |
| 6185 | 4056 | 2505 | 10-4-56 | Myrtle Creek | [redacted] | 0.04 | 20/1E | Govt. Lot 1 | 1 | Dom. (0.01), Stock & Irr. 4 Ac. (0.03) | --- |
| | | | | | Spring Creek Tributary Hale Passage (549) | | | | | | |
| 3180 | 1674 | 523 | 10-9-30 | Spring Creek | [redacted] | 0.02 | 20/1E | NESE | 1 | Irr. 1 Ac. | --- |
| 11514 | 8467 | 5481 | 7-14-52 | Spring Creek | | 0.01 | 20/1E | SENE | 1 | Irr. 1 Ac. | S, D |

Unnamed Spring Tributary Puget Sound

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16311 | 12176 | 8046 | 8-30-60 | Unnamed spring | (b) (6) | 0.01 | 20/2E | Govt. Lot 1 | 18 | Dom. | S |

Unnamed Springs Tributary Carr Inlet (550, 551 & 552)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16307 | 12175 | | 8-30-60 | Unnamed springs | (b) (6) | 0.40 | 20/1E | Govt. Lot 3 | 12 | Com. Dom. (0.30) & Irr. 5 Ac. (0.10) | --- |

Unnamed Springs Tributary Carr Inlet (553)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16322 | 12177 | 8382 | 9-6-60 | Unnamed springs | (b) (6) | 0.10 | 20/1E | Govt. Lot 2 | 12 | Com. Dom. | S |

Unnamed Springs Tributary Carr Inlet

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9021 | 7154 | | 8-22-49 | Two unnamed springs | (b) (6) | 0.08 | 20/1E | Govt. Lot 3 | 2 | Dom. | --- |

McNEIL ISLAND

Luhr Creek Tributary Pitt Passage (558)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3572 | 1868 | 735 | 12-10-31 | Unnamed reservoir in Luhr Creek | (b) (6) | 0.90 | 20/1E | Govt. Lot 2 | 17 | Dom. (0.01), Power (0.88) & Irr. 1 Ac. (0.01) | --- |

ANDERSON ISLAND

Unnamed Stream Tributary Balch Passage (560)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11628 | 8719 | | 8-26-52 | Unnamed stream | (b) (6) | 0.05 | 20/1E | Govt. Lot 2 NWNE | 29 32 | Dom. (0.01), Stock & Irr. 5 Ac. (0.04) | S |

Unnamed Stream Tributary Balch Passage (561)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15799 | 11986 | | 12-7-59 | Unnamed stream | (b) (6) | 0.01 | 20/1E | NENE | 32 | Dom. | S, D |
| 15891 | 11988 | | 2-11-60 | Unnamed spring | | 0.01 | 20/1E | E½NE | 32 | Dom. | S |

Unnamed Stream Tributary Balch Passage (562)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12303 | 9136 | 5550 | 4-28-53 | Unnamed stream | (b) (6) | 0.005 | 20/1E | SENW | 33 | Dom. | --- |

Unnamed Stream Tributary East Oro Bay (570)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9053 | 6662 | 3829 | 9-6-49 | Unnamed stream | (b) (6) | 0.01 | 19/1E | SENW | 8 | Stock | --- |
| 9112 | 6564 | 4813 | 9-26-49 | Unnamed stream | | 0.20 | 19/1E | NWNE | 8 | Dom. (0.01), Stock & Irr. 20 Ac. (0.19) | S |
| 16145 | 11594 | | 6-28-60 | Unnamed stream | | 0.06 | 19/1E | SWSE | 5 | Dom. (0.01) & Irr. 5 Ac. (0.05) | S |

Unnamed Spring Tributary Amsterdam Bay (580)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13047 | 9863 | 6939 | 7-29-54 | Unnamed springs | (b) (6) | 0.01 | 19/1E | Govt. Lot 2 | 6 | Com. Dom. | S, D |

## APPENDIX E

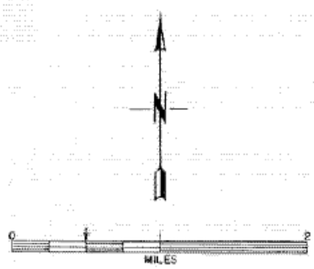
Appendix E consists of 33 maps, each showing the points of diversion and withdrawal in a specific township for valid water right filings listed in Appendices C and D. Lands of 10 acres or more covered by irrigation rights are also indicated on these maps. Although an entire property may be shown as being covered by irrigation rights, only a check of appendix C or D, as the case may be, will accurately determine the extent of a specific right.


## EXPLANATION

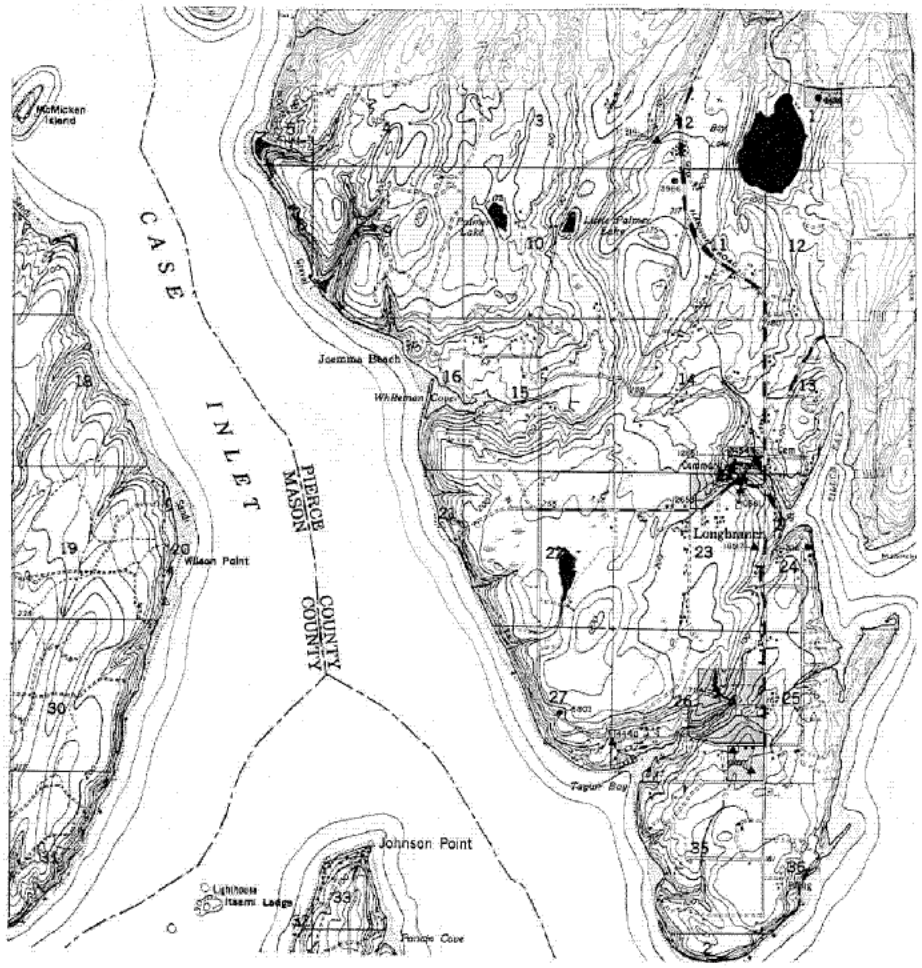
- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U. S. G. S. Topographic Quadrangles




# T19N R1E & PART OF R1W




## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 ½ 1 2
MILES

# T20N R1W


## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1 2
MILES

# T 20 N R I E


## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1 2
MILES

# T 20 N R 2 E

## EXPLANATION

- • Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

0 1 2
MILES

# T 21 N R 1 W

## EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

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0 1 2
MILES

T 21 N R 1 E


## EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

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MILES

# T 21 N R 2 E


## EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

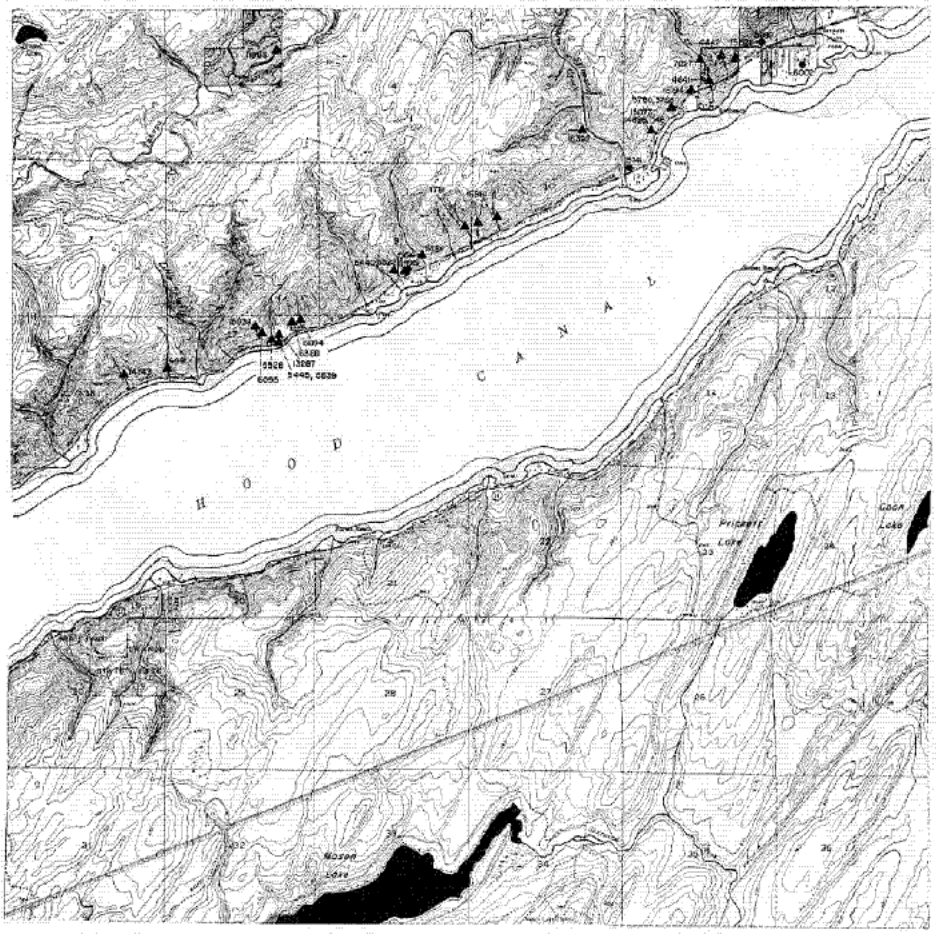
Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1 2
MILES

# T 22 N R 3 W




## EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

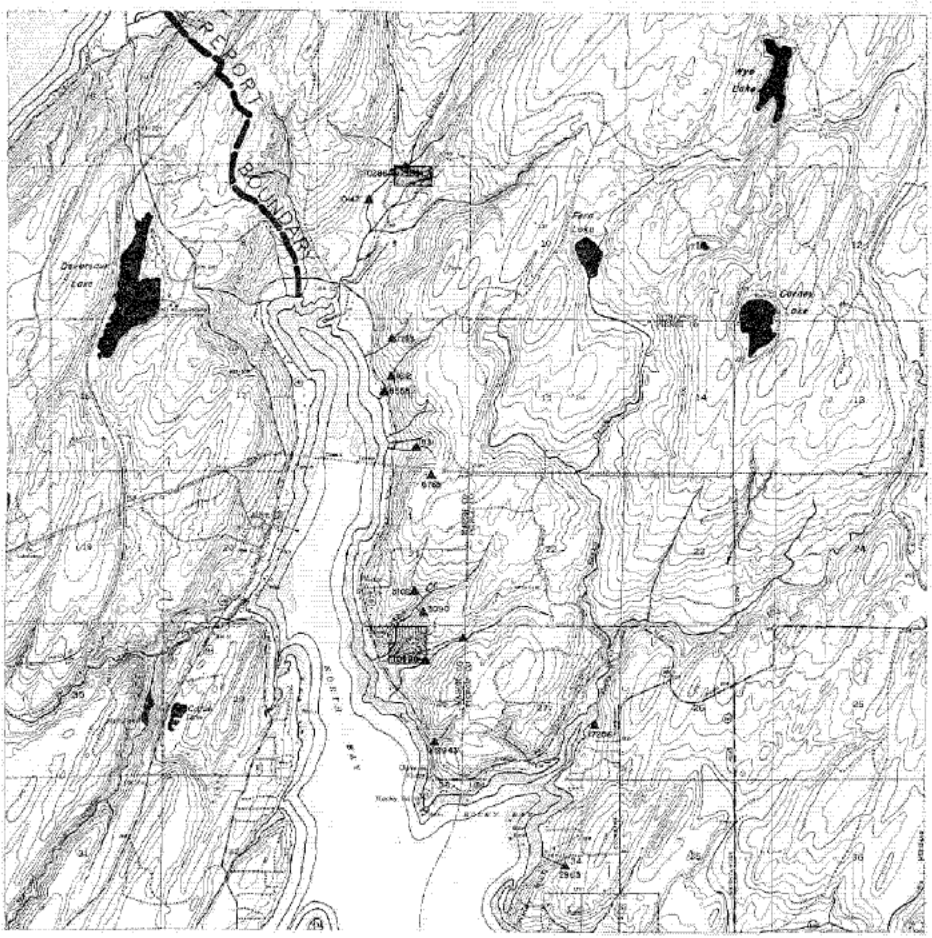
Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1 2
MILES

# T 22 N R 2 W




## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

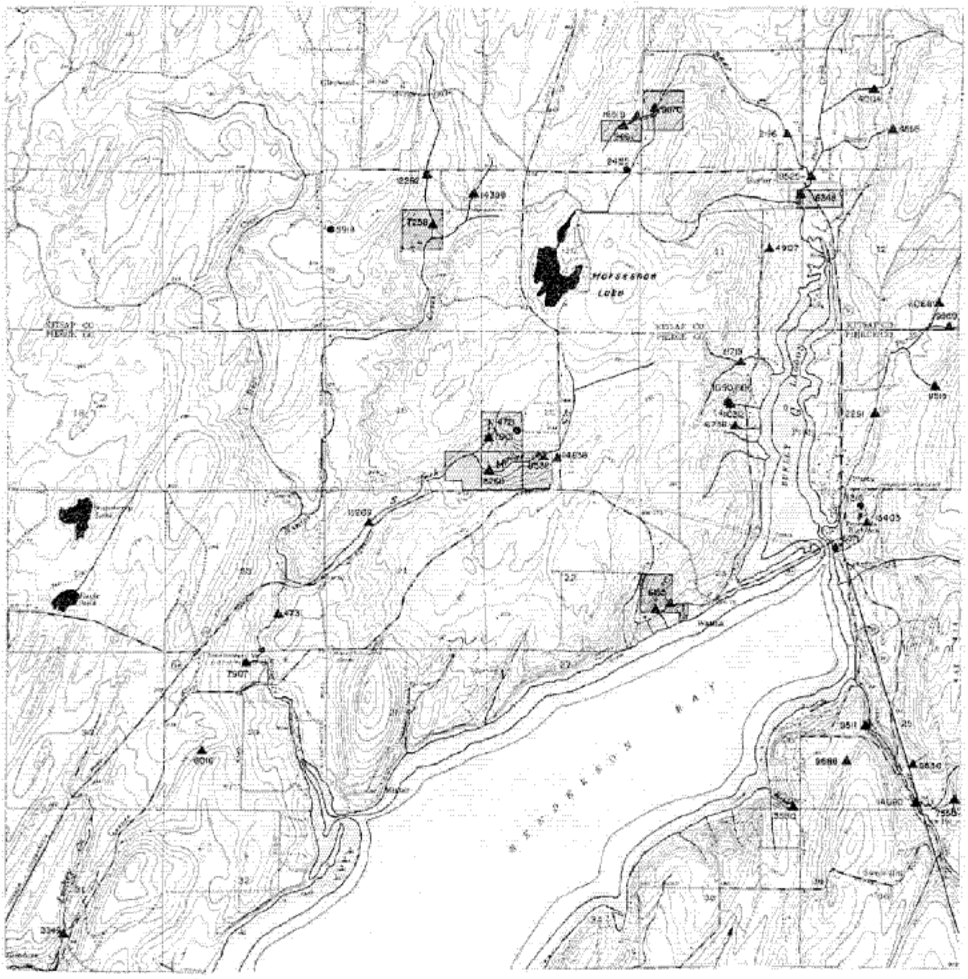
Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1 2
MILES

# T 22 N R 1 W



## EXPLANATION

● Point of withdrawal for ground water right

▲ Point of diversion for surface water right

Land exceeding 10 acres covered under ground water right, and associated point of withdrawal

Land exceeding 10 acres covered under surface water right, and associated point of diversion

Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1 2
MILES

# T 22 N R 1 E


## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

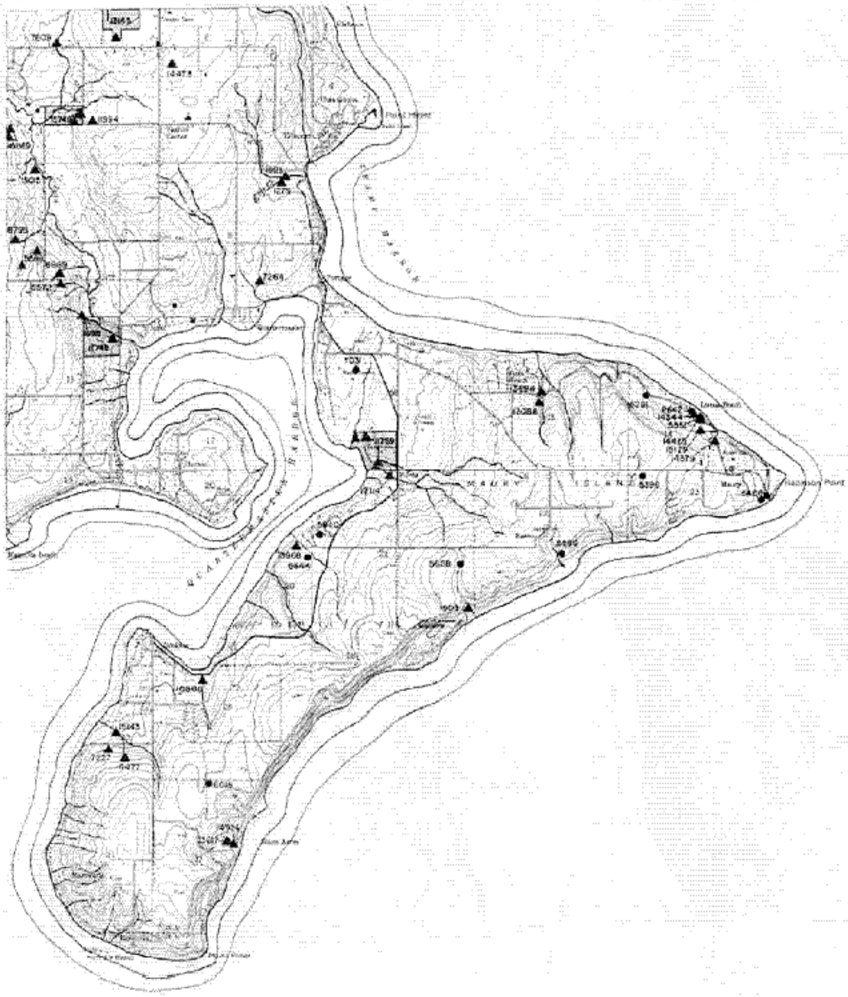
Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1 2
MILES

T 22 N R 2 E



## EXPLANATION

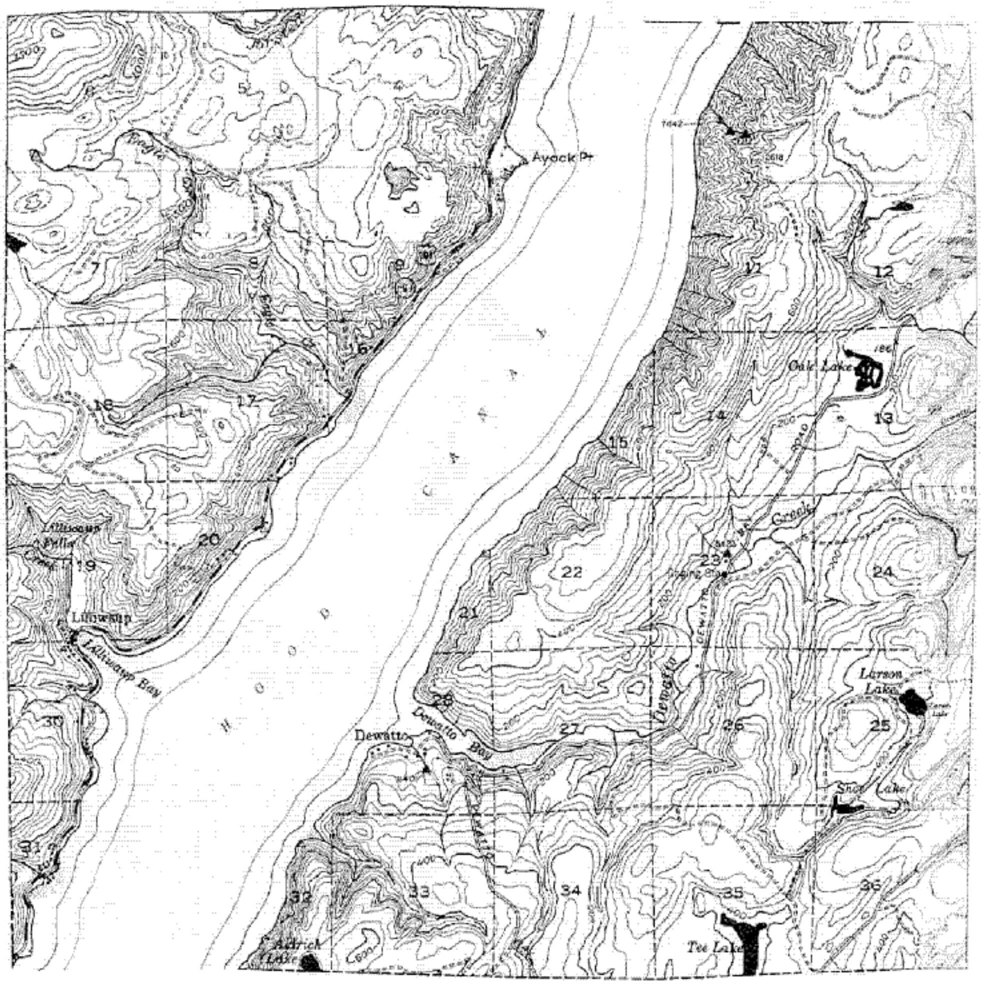
- • Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

0 1/2 1 2
MILES

# T 22 N R 3 E




## EXPLANATION

• Point of withdrawal for ground water right

▲ Point of diversion for surface water right

Land exceeding 10 acres covered under ground water right, and associated point of withdrawal

Land exceeding 10 acres covered under surface water right, and associated point of diversion

Land exceeding 10 acres covered under both surface and ground water rights

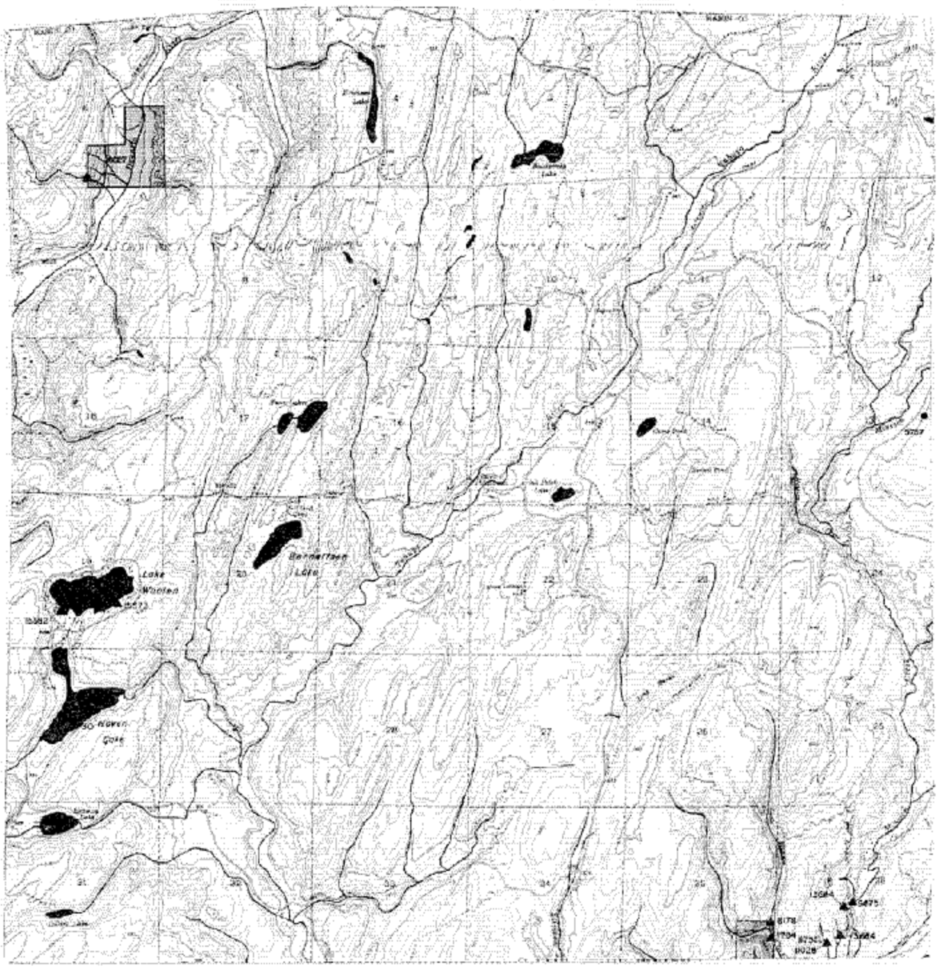
Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1 2
MILES

# T 23 N R 3 W



## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

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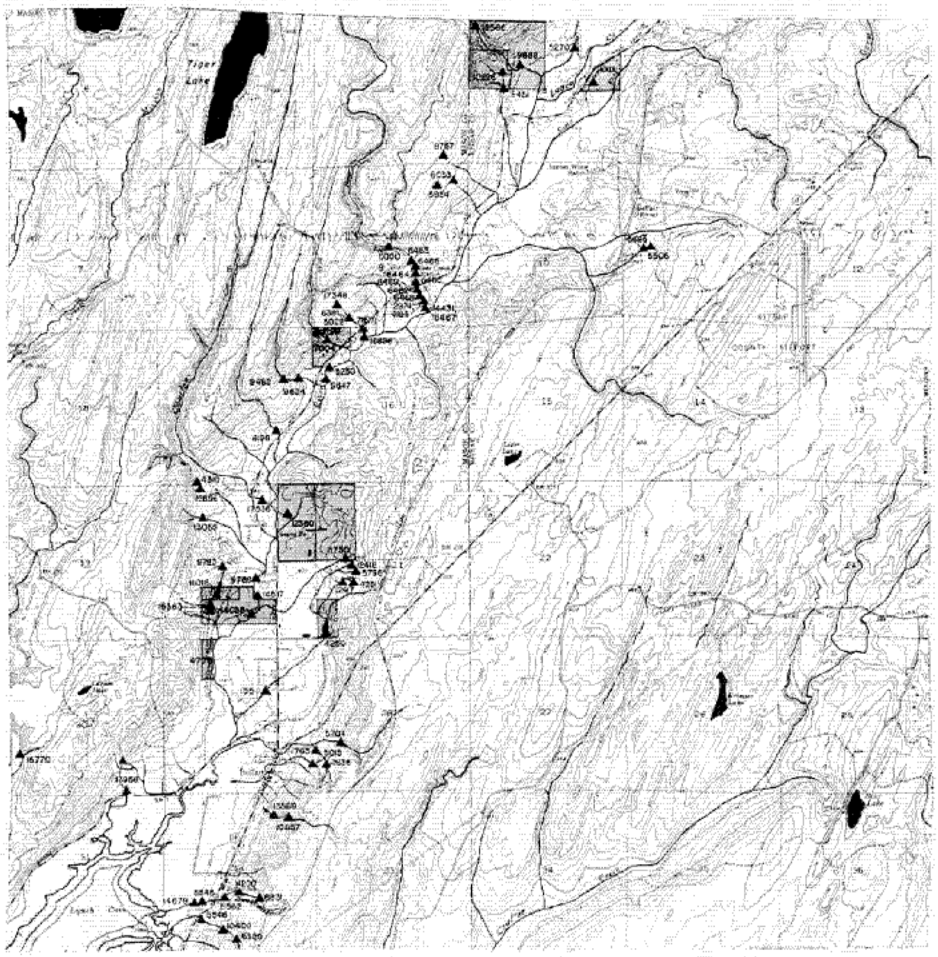
MILES

# T 23 N R 2 W




## EXPLANATION

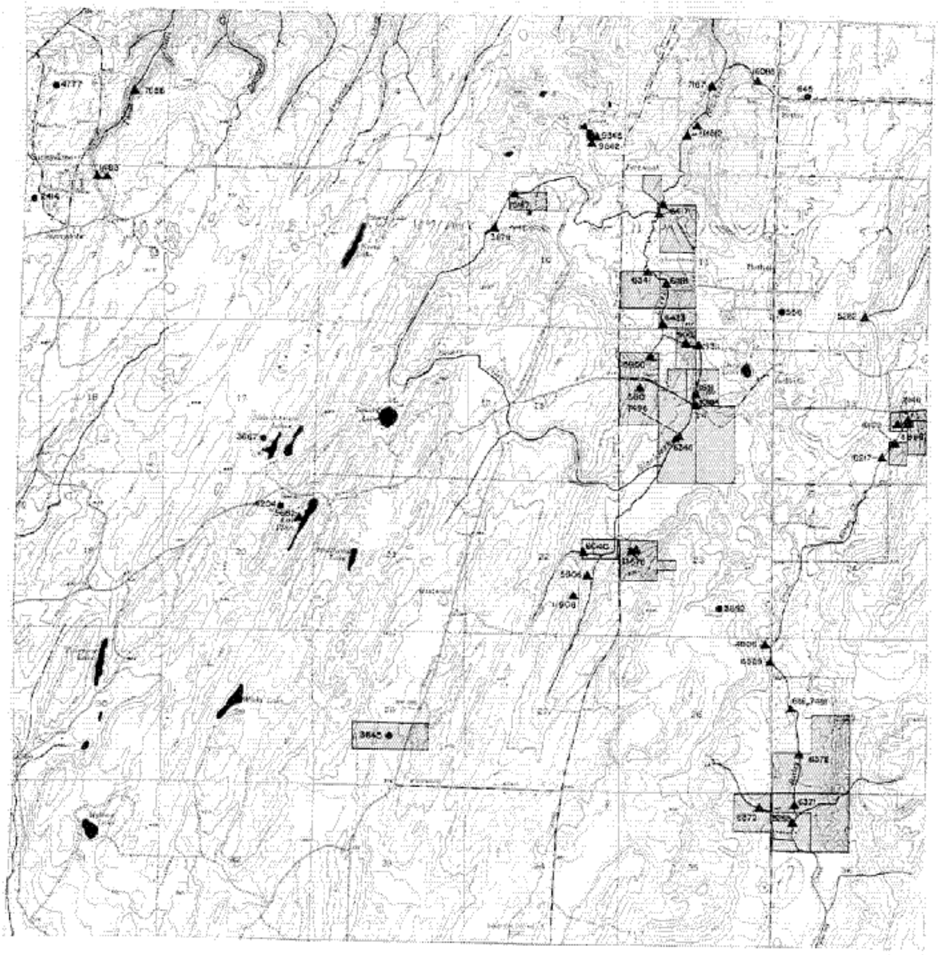
- • Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

MILES

# T 23 N R 1 W

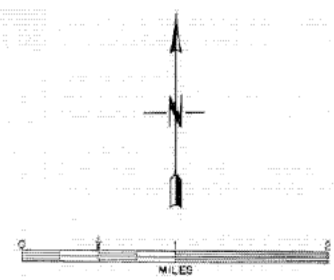


## EXPLANATION

- • Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles




# T 23 N R I E

## EXPLANATION

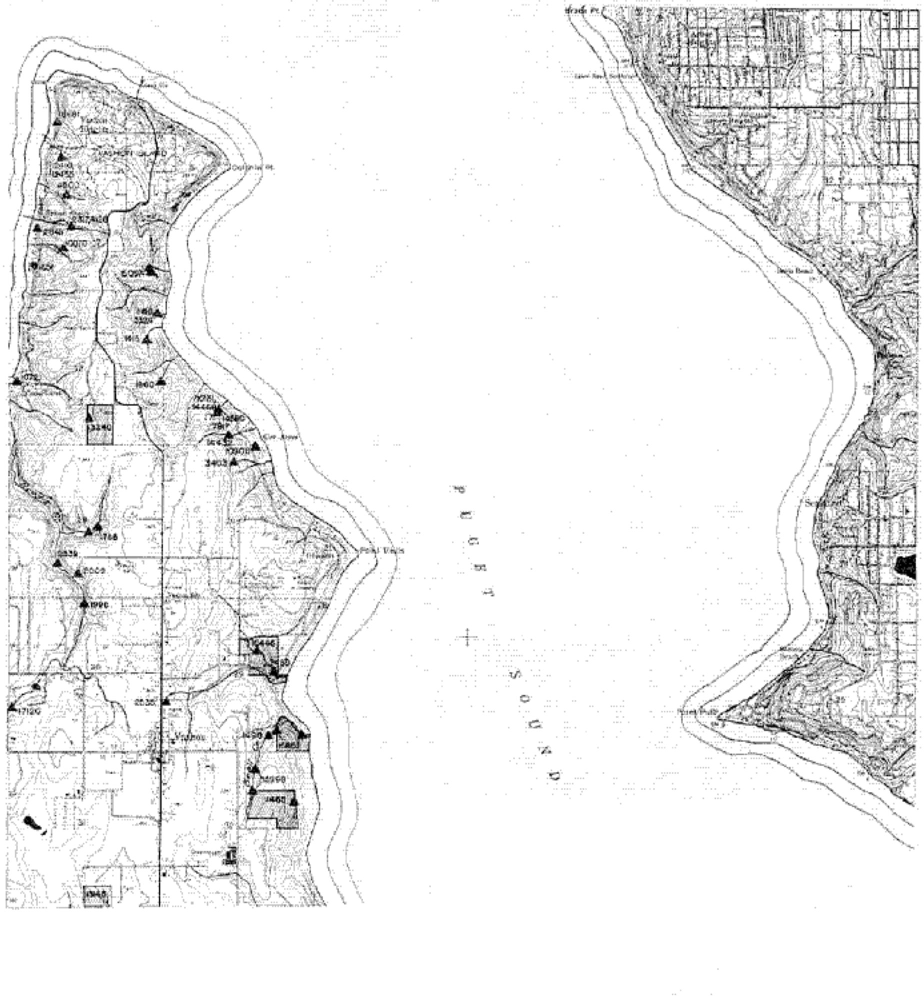
- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

MILES

# T 23 N R 2 E




## EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

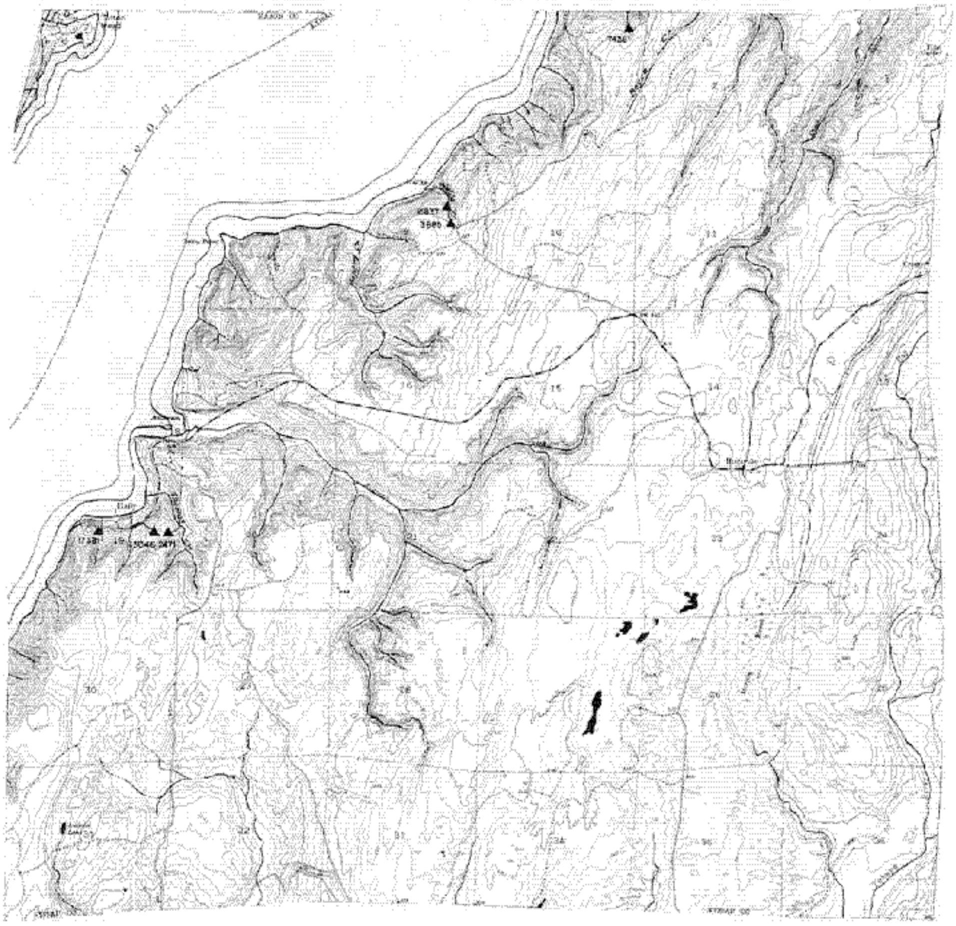
Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U. S. G. S. Topographic Quadrangles

N

0 1 2
MILES

# T 23 N R 3 E



## EXPLANATION

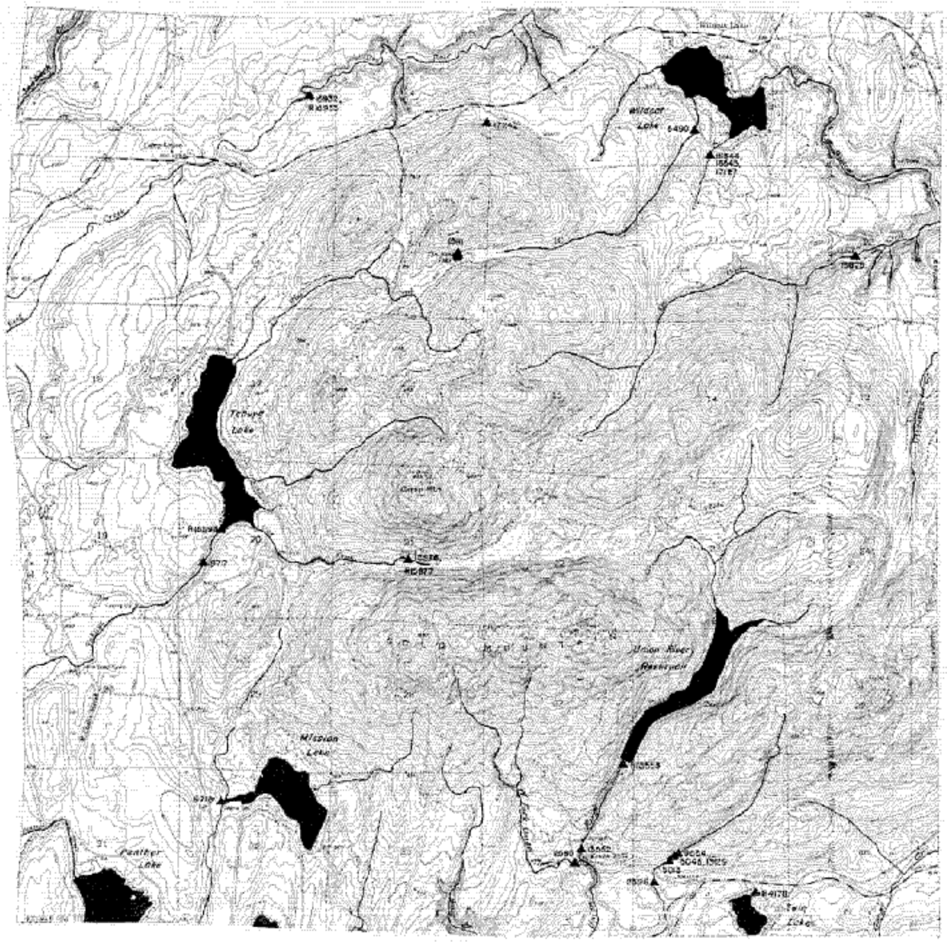
- • Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

0 1 2
MILES

# T 24 N R 2 W



## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1/2 1 2
MILES

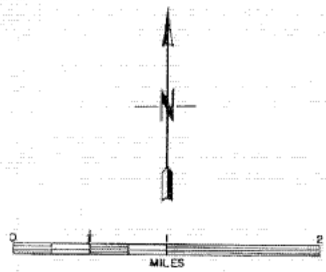
# T 24 N R I W


## EXPLANATION

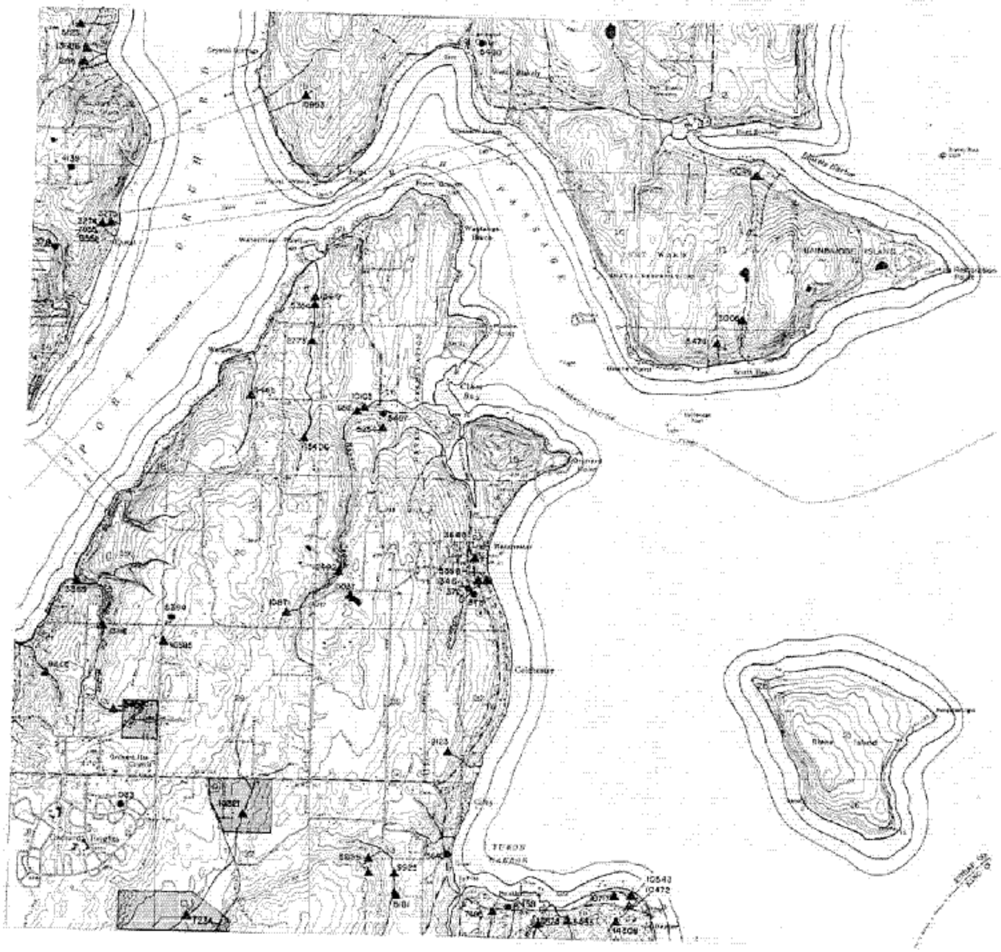
- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U. S. G. S. Topographic Quadrangles




# T 24 N R I E



## EXPLANATION

- • Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

0 1 2
MILES

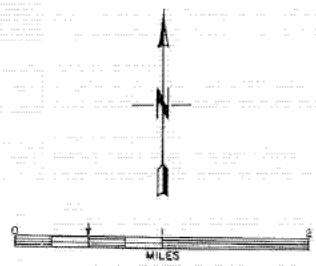
# T 24 N R 2 E


## EXPLANATION

- • Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles



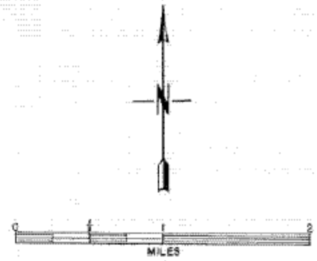

# T 25 N R 2 W

# EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U. S. G. S. Topographic Quadrangles



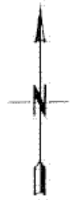

## T 25 N R I W

## EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles





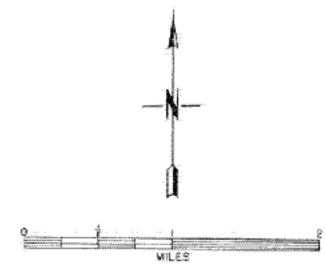
# T 25 N R 1 E

## EXPLANATION

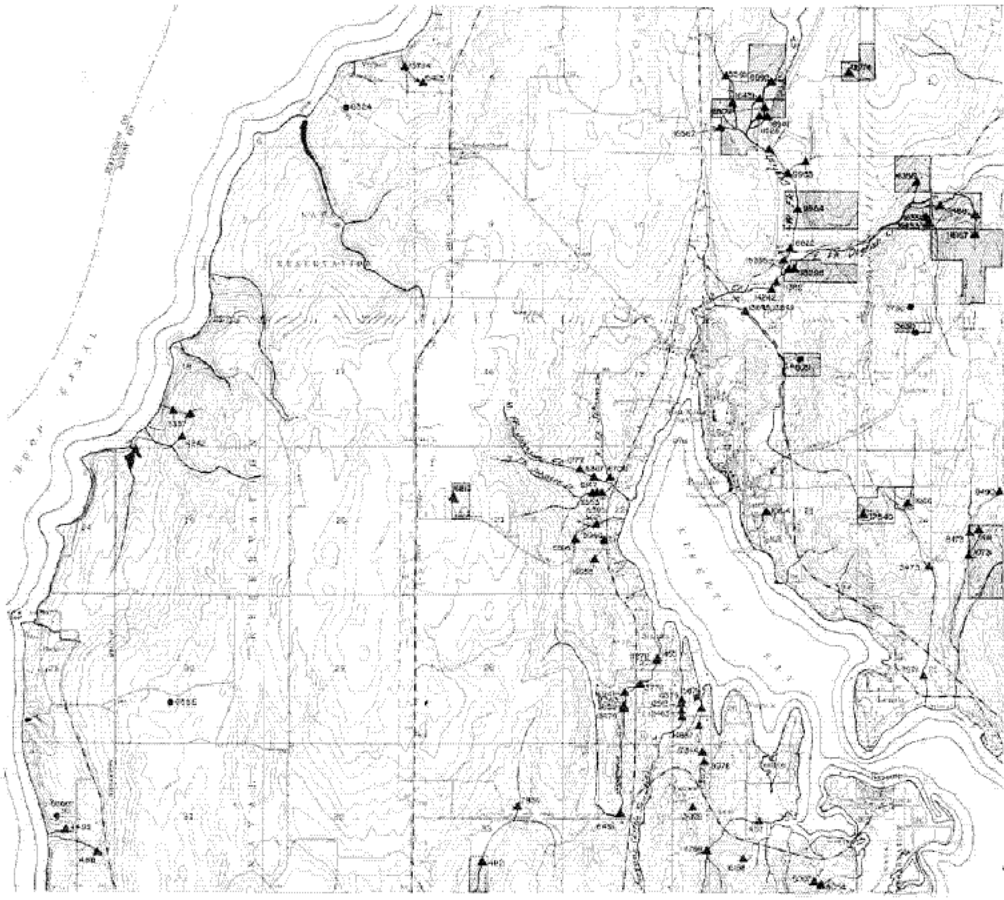
- • Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles




# T 25 N R 2 E

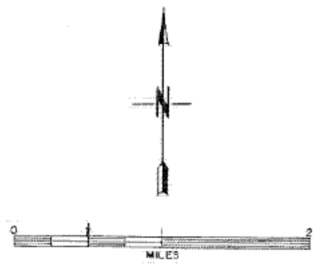


## EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles




# T26N R1E & PART OF R1W

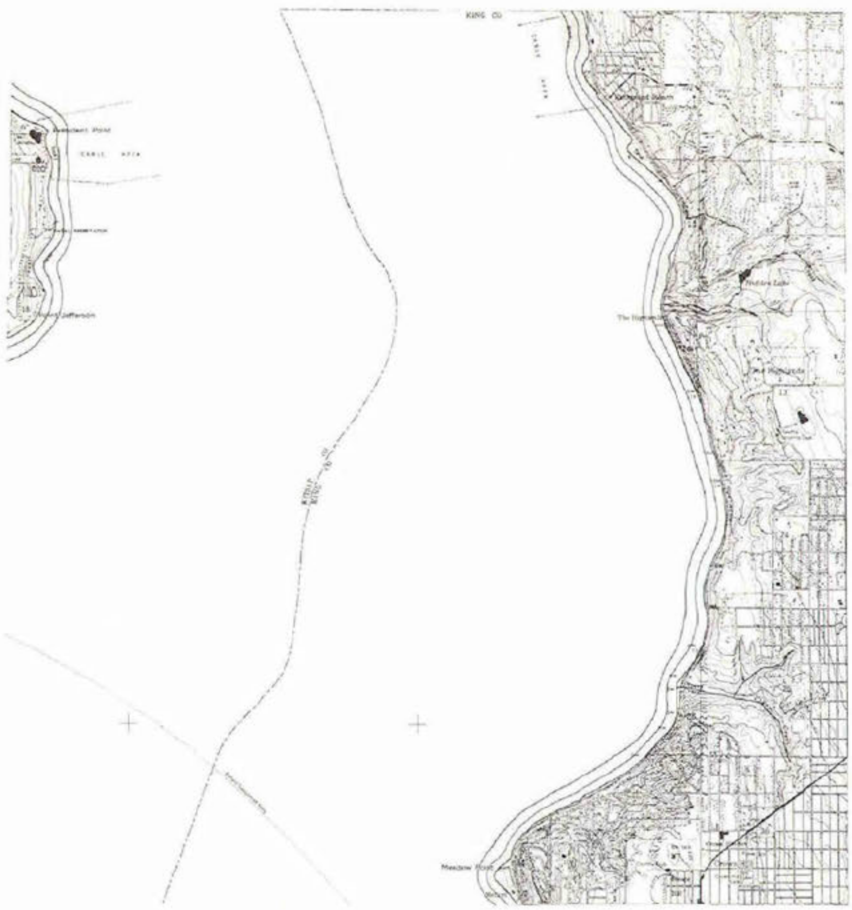

## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles


# T 26 N R 2 E

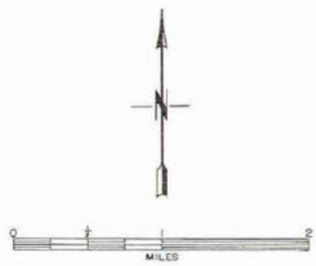



## EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles




# T 26 N R 3 E


## EXPLANATION

- Point of withdrawal for ground water right
- Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

0 1 2
MILES

# T 27 N R I E


## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

N

MILES

# T 27 N R 2 E


## EXPLANATION

- ● Point of withdrawal for ground water right
- ▲ Point of diversion for surface water right
- Land exceeding 10 acres covered under ground water right, and associated point of withdrawal
- Land exceeding 10 acres covered under surface water right, and associated point of diversion
- Land exceeding 10 acres covered under both surface and ground water rights

Number adjacent to point of diversion or withdrawal refers to water right application number

Base maps are U.S.G.S. Topographic Quadrangles

MILES

# T28N R2E & PART OF R1E